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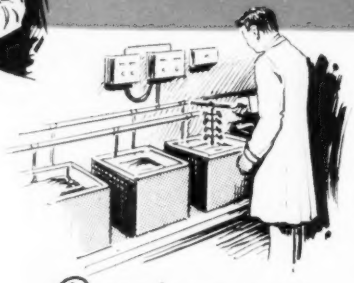

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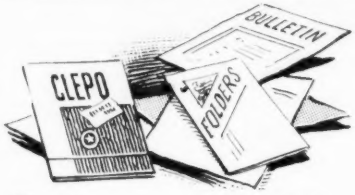

Sales Promotion

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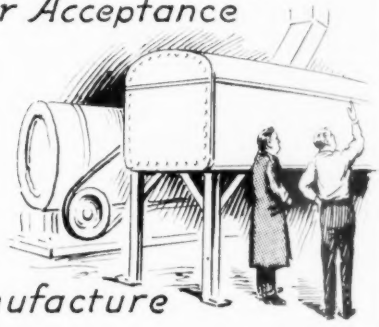
4 Order Acceptance



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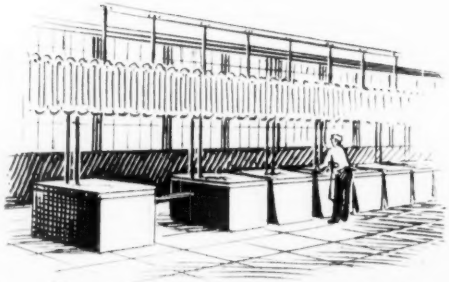

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CONTENTS

Editorial 199

Salvage by Electrodeposition—By Harold Narcus 200

Suggestions for Selection of Buffing Wheels—Part II—By Gerald A. Lux 203

The Antiquity of Tools—Part IV—By Joseph Danforth Little 208

Systematic Identification of the Common Metallic Coatings—By Howard Nechamkin and Alvin Sanders 210

Coatings for Steel Cartridge Cases—By R. A. Brenneck and R. L. Norum 245

Dip Tank Construction—Conclusion 249

Protecting Pre-Plated Metals—By Kenneth Main 252

DEPARTMENTS

Dictionary of Metal Finishing Chemicals 211
This Is Washington 213
Shop Problems 216
Patents 217
New Equipment & Supplies 220
Associations 226
Manufacturers' Literature 229
News from California 230
Obituary 232
Business Items 234
New Books 237

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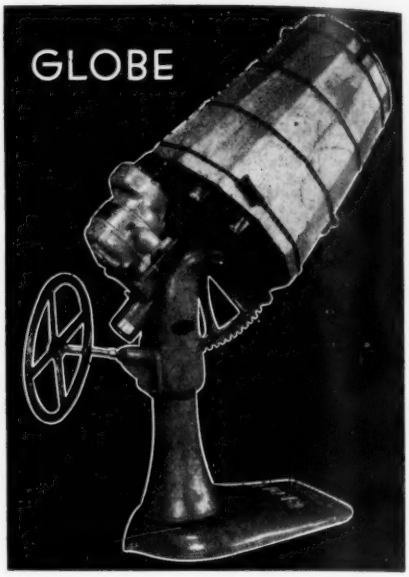

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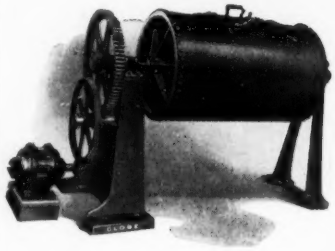

No. 6 HORIZONTAL FOUNDRY BARREL

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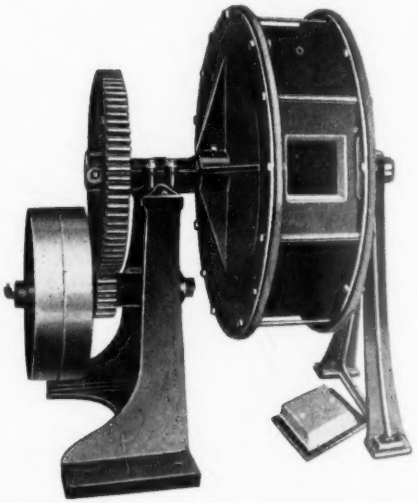


THE Globe MACHINE AND STAMPING CO.
CLEVELAND 2, OHIO

VOL. 42, NO. 4 METAL FINISHING APRIL, 1944
PREPARATION, ELECTROPLATING, COATING

RELIEF FOR SMALL WAR PLANTS

Since the outbreak of hostilities, the small manufacturer has been the recipient of a great deal of sympathy but not much else. Next to the labor shortage, keeping up with the red tape and paper work required in turning out war materials has been the greatest problem of the little fellow who, unlike the large producer, is not in a position to maintain a staff of priority experts. Time spent by the small manufacturer in filling out the seemingly vast number of forms is time lost from the production line and a constant source of irritation to already overburdened executives.

The recent revision of the War Production Board's procedures for allocating cadmium and controlling the use of cadmium products will result in a great reduction in the amount of paper work required and will be a source of gratification in our industry. The amended order frees persons using 100 pounds per month or less from the requirement for filing requests with WPB and the new forms relieve platers of determining the ultimate use to which the metal is to be put.

Consequently, the small user of cadmium, who was generally least able to process the old forms with any degree of efficiency, will benefit most, especially since he may now purchase cadmium freely from a supplier upon certification that the terms of General Preference Order M-65 are being observed.

Although this revision, in itself, is not of major importance, we hope that it signifies the establishment of a new policy with respect to allocation and restriction orders, which recognizes the peculiar situation of the small war plant.

Salvage by Electrodeposition

By HAROLD NARCUS

Chief Chemist, Plating Process Corp., Holyoke, Mass.

PART I—CHROMIUM

ALMOST immediately following the outbreak of the present hostilities, the principal industries in the United States, in carrying out their respective enormous war programs, were confronted with an acute shortage of tool and machine steels; in fact, they were soon forced to seek methods for increasing the life of their various tools, such as cutters, reamers, plug-gauges, drills, etc., and in many cases were required to salvage machine parts worn from heavy usage and subjected to excessive wear. In addition, they were compelled to build up parts ground undersize by new machine operators or machined undersize from changes in dimensions attributed to an alteration of blue-print readings. This situation has been relieved tremendously by the modern science of electrodeposition. Today millions of dollars and many man-hours are saved by manufacturers who are keen enough to utilize the skill and experience of the electroplater to solve these salvage problems.

The purpose of the present article is to review in some detail the three most common electrolytic methods used as means of salvage by industrialists confronted with a shortage of critical base materials, labor, and machines for producing essential parts. The three processes which are utilized to the greatest extent for this purpose are:

(1) Salvage using "hard" or industrial chromium deposits.

(2) Salvage using heavy nickel deposits.

(3) Salvage using iron deposits.

Industrial chromium, or "hard" chromium plating, is probably the most common procedure for the salvage of parts because of the fact that besides serving as a means to build up an area to dimension, the resulting outer layer is hard, possessing a low coefficient of friction, and resistant to heat and wear. It is, however, not suitable for corrosion resistance unless it is deposited in sufficient thickness. These unique properties of hard chromium properly applied have led to its use on numerous machine parts and tools. Gauging devices, cutting tools, internal combustion engine parts, grinder spindles, bronze screen plates, tensions, guides, drop-wires, plastic molds, metal drawing and forming dies, rolls and printing equipment, represent some of the parts in the various industries which have been successfully hard chromium plated, and reports presented in the literature substantiate the broad statement that the hard chromium plated part will far exceed the same unplated part in length of life and efficiency.

All photos in this article courtesy of Hartford Chrome Corp.

At the present time, heavy coatings of chromium are plated on the local undersized areas to bring the surface to size dimensionally and also to take advantage of the special properties of this metal. In this type of deposition the plate is applied directly upon the basis metal. The thickness of the deposit naturally depends upon the amount needed to bring the area up to finished size. If the part is only slightly undersize, it is further ground undersize before plating, then is plated oversize, and then finish ground and lapped to blue-print size. In practice, thicknesses from 0.0003″-0.050″ are considered reasonable but at least 0.003″ thickness for heavy service should remain after grinding off chromium to size.

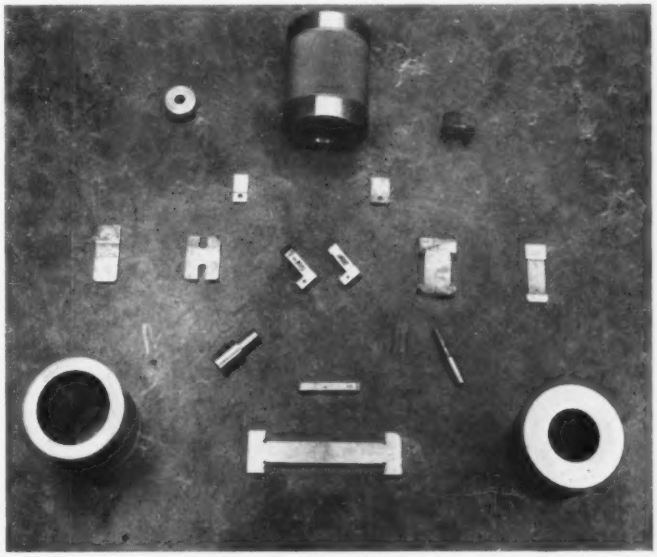
At this point the writer will discuss hard chromium plating more specifically and perhaps mention some of the procedures usually followed throughout the industry in order to obtain good, bright chromium plate. Owing to the fact that this type of deposition usually calls for electroplating the chromium directly upon the basis metal, it invariably reproduces or even accentuates any defects in the latter, such as pits, scratches, ridges, etc., which are often found on worn machine parts. Proper grinding is a suitable method for removal of these de-

fects on worn parts or hardening scale on unfinished undersized areas. The grinding must be accomplished without producing checks, glaze or other imperfections. A free-cutting open-bond aluminum oxide is sometimes used. Some use an Aloxite A-45-M-3100 wheel with a soluble oil coolant or a vitrified Alundum 3846-K5BE wheel. Naturally, when it is essential to have a highly polished surface, as in the case of plastic molds, it is necessary to produce that surface on the basis metal prior to plating. In this case, grinding is followed by extensive polishing with fine abrasives. Even on machine parts a slight polishing operation on a buff wheel is sometimes advisable, provided the tolerances of the part are not altered to a great extent. Another method of preparing a part which has excessive scale is a grit-blast treatment with a No. 90 steel grit. We have found that steel grit is much more economical and efficient to use than sand because of its longer life and because it does not glaze the surface of the part.

Preparation of Work

After a metallurgical study of the basis metal, the part is ready for masking off areas not to be plated, if such an operation is required. The oil or grease on the part is first removed in the usual manner using vapor degreasing or a suitable organic solvent. The part to be masked must be thoroughly clean at this point, especially if a stop-off lacquer is to be used. If this condition has not been obtained by degreasing, the usual hot alkaline cleaner can be used to remove any thin film of oil or grease still remaining. Good adhesion of the stop-off lacquer, if this method of masking is utilized, cannot be obtained on a surface which is not properly cleaned. Many platers do not realize the importance of this fact. A good procedure is to clean a part for lacquering as you would for plating. There are many methods for masking parts for hard chromium plating. Some platers utilize stop-off lacquers which are resistant to the action of the electrolyte, some make use of plastic parts properly machined to the desired size and shape, others employ plastic tapes. Lead foil properly wrapped on the areas to be stopped-off is being used extensively.

The method of racking in hard chromium plating is most important and the success or failure of a job may depend upon it. However, a discussion of racking in this article would be out of place. In the long plating time employed in industrial chromium plating variation in current distribution, characterized by high current densities on the edges and corners of the work and comparatively low current densities on flat areas and depressions, must be stressed. Shields of insulating material are used to direct the current to certain areas and metal "thieves" or guards connected to the cathode are employed to prevent excessive current density on sharp edges or points resulting in burnt deposits at these points.



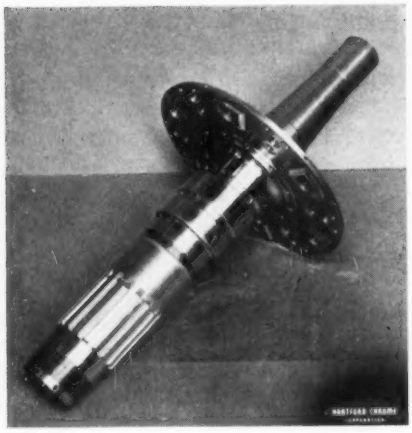
Because of the poor throwing power of the bath, auxiliary anodes should be used whenever possible. Lowering the current density and temperature will also improve the throwing power of the bath. Key-ways, center-holes, splines or slots which the manufacturer does not want plated because of unnecessary grinding after plating, are usually filled with plastic wood topped with lacquer or plastic plugs made to fit tightly.

The two major factors involved in selecting and preparing the basis metal to receive a chromium deposit are metallurgical and chemical. The backing for thickly applied hard chromium must be such as to resist deformation. It must be free from hardening strains or else the plate will peel or flake during plating because of the tremendous amounts of hydrogen gas liberated at the cathode. Recommended hardnesses of the base metal for various parts will be discussed later in this article. The steel or other base metal must also be thoroughly cleaned.

There are a number of methods for cleaning the area to be plated after the masking operation is completed. All have proved to be adequate. On the usual types of machine steels or tool steels the area to be plated can be thoroughly scrubbed with hot alkaline cleaner and fine pumice, rinsed and etched anodically in a 50° Be sulfuric acid bath at 6 volts for ½-1 minute at room temperature. It must be pointed out that certain grades of steel require a variation in the time of etching. In these types the time should not be too long as a smut may be formed on the surface resulting in plating difficulties. If such is the result, the smut should be scrubbed off with pumice and water. The part is then thoroughly rinsed. This sulfuric acid etch should only be used on tightly masked parts. If acid seeps under the masking it will badly etch finished surfaces even while plating is taking place. If there is any danger of acid seepage, after scrubbing with cleaner and pumice and rinsing, the part should be transferred to a chromic acid etch tank (28 oz./gal. CrO_3) with little or no SO_4 content (0.1-0.2 oz./gal. at 130°F. and the work is made anodic at 2 amp./sq." for 1-3 minutes, or longer on some alloy steels. The part is then transferred directly to the chromium plating bath.

The above procedure may be altered for special alloy steels. This is why the plater should be given a metallurgical analysis of the basis metal to be plated. Different basis metals require different treatment in the cleaning cycle and sometimes in the plating bath itself. Most steels are plated at a low current density at the beginning which is gradually increased over a period of time.[4] On the other hand, cast-iron is given a high current density at the outset and then brought down to its normal plating amperage.

Very satisfactory results are obtained from the standard 33 oz. chromium bath. At low temperatures the hardness of the deposit varies inversely



as the current density while at the higher bath temperatures, the relation is reversed. At the elevated temperature of 131°F. and current density of 3 amp./sq.", about 0.0015" of chromium is deposited per hour.

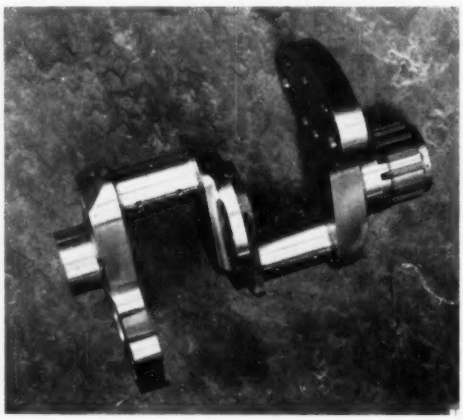
Some platers use the 53 oz. or concentrated bath and even other concentrations, but the dilute standard bath is very satisfactory and perhaps most widely used for industrial chromium plating. It requires a lower initial investment, operates at a higher current efficiency and possesses better throwing power than the standard concentrated bath. The only advantages of the latter bath are that, because of its higher conductivity, lower voltages are necessary and the bath is less sensitive to impurities and changes in bath composition.

Hardness of Deposit

Discussing the metallurgical factor in hard chromium plating, it is important to remember that the hardness of the basis metal should be high enough to offer the proper underlying medium to the deposit. Because of the large amounts of hydrogen evolved during deposition, however, the steel should not be in an excessively stressed condition as this evolution of gas will accelerate cracking under these conditions. Various tools and machine parts require different hardnesses before plating. Generally speaking, a Rockwell hardness value on the "C" scale between C 50 and C 62 is desirable. Below are listed the recommended hardness values for a few applications as reported by leading investigators:

Plug gauges	50-60	Rockwell C scale
Ring gauges	50-60	" " "
Flat and Caliper gauges	45-50	" " "
Snap gauges	44-48	" " "
Plastic molds	55-60	" " "
Dies	50-52	" " "
Rolls	55-62	" " "
Drills, Reamers Cutting tools	62-64	" " "
Pump shafts	55-62	" " "
Drawing dies	62 inside / 45 outside	" "

Because of the fact that several companies have utilized hard chromium for extending the life of such parts as drills, reamers, drawing plugs and dies, plastic molds, burnishing bars and files to a very large extent, the writer would like to mention the recommended thicknesses, temperatures and current densities in handling these specific parts:



Drills are usually plated at 122°F. for ½ hour at 1½-2 amp./sq." (0.0002"-0.0003" thickness). Complete coverage of the drill is necessary.

Reamers are plated with 0.0002"-0.0003" thickness at 122°F. and 1½-2 amp./sq.".

Drawing plugs and dies are plated to a thickness of 0.0025"-0.003" at 131°F. and 2 amp./sq.". After heat treating they are ground and lapped to a high luster and smoothness.

Plastic molds are plated 0.0005" to 0.001" with chromium at 113°F. and ½-1 amp./sq.".

Burnishing bars are usually plated with 0.0005" - 0.003" of chromium at 122°F. and 1-2 amp./sq.". The thicker deposits necessitate grinding and lapping after plating.

Files are plated with only a thin coating for about 5 minutes at 113°F. at 2½ amp./sq.".

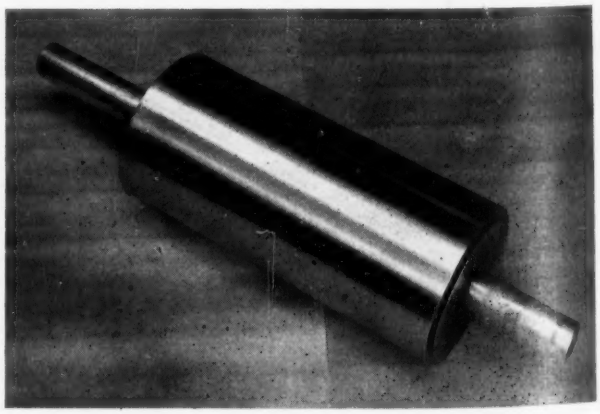
In practically all cases the tools should be heat treated after plating. In fact, all chromium plated articles which must withstand shock or bending should be heat treated. The tempering of the steel governs the length of time and the temperature which can be utilized. A reasonable range is 200-300°C. for ½-2 hours using oil as the heating medium.

The value of chromium in the case of cutting tools and plastic molds lies in its low coefficient of friction, and the failure of other materials to stick or weld to it even at high pressures and temperatures. Most tools, after chromium plating and subsequent wearing, can be stripped and replated repeatedly. The plating of drills insures free chip removal. Chromium plating of files reduces the tendency to clog, especially when filing soft metals.

Experience has proved that excessive deposits should not be applied to cutting tools which are undersized to a great degree. The danger of chipping is prevalent even after heat treatment. Extreme care is necessary so that no excessive build-up will occur on the cutting edges. Nodular cutting edges and points will almost always chip when the tool is used.

After chromium has been deposited to thicknesses ranging from 0.002" up to considerable thickness, it is generally necessary to grind the deposit to finished dimension. A free-cutting, open-bond grinding wheel is recommended. When cutting dry, the wheel speed should be around 6000 SFPM (surface feet per minute) while the work speed should be around 80-90 SFPM. Wet wheels operate close to

(*Concluded on page* 207)



Suggestions for Selection of Buffing Wheels

By GERALD A. LUX*

Divine Brothers Company, Utica, N. Y.

PART II

BUFFING has been described in Part I of this series (*Metal Finishing*, Jan. 1944) as a light metal-removing operation or metal-smoothing operation. In general, buffing is intended to produce smooth, bright, reflective, scratch-free surfaces. A surface, deeply scratched or very rough, cannot be economically buffed to a smooth finisn. unless it is of a soft materiai.

Essentially, a buffing operation requires a buffing wheel, a lathe on which to mount the wheel and rotate it, an abrasive buffing composition and an operator experienced in the art. This article will be confined to description of the various types of buffing wheels and their recommended applications.

Materials Used in Buffing Wheels

A simple non-commercial buffing wheel can be made by placing a number of circular pieces of fabric together to a desired thickness and punching an arbor hole in their center. When assembled on a lathe spindle and held tightly between two smaller diameter flanges, a workable buff is obtained. Buffs of various characteristics can be obtained, depending on the fabric used. The selection of the proper fabric for a particular buffing operation is of considerable importance. Performance, quality of finish produced, effective life of a wheel, adhesion of the buffing composition, and costs per piece buffed are dependent in varying degrees on the type of material used in the construction of a buffing wheel.

Most buffing wheels are made from cotton sheeting. Cotton sheetings are woven from cotton yarn or thread. They are described in the trade by the number of warp and filling threads per inch (warp—lengthwise threads, filling—cross threads) and the lineal yards per pound. Thus, a coarse, open-weave sheeting might be designated as a 48/48—2.85—40", indicating that there were 48 threads per inch in the width and length and that a pound of 40" wide material would be 2.85 yards long. A fine, close-weave sheeting might be designated as an 84/92—2.90—40", indicating 92 lengthwise threads and 84 cross threads per inch and 2.9 yards of 40" material per pound.

Other factors, such as the staple or length of the cotton fibres in the yarn, the amount of twist used in spinning the cotton yarn, the diameter of the yarn and the method of weaving, have definite effects on the quality of the cotton sheeting produced. These important factors are not included in the trade designation. As a result, it is impossible to obtain many grades or qualities of sheeting to the same thread count and yardage per pound specifications. Figures 1 and 2 are macro-photographs of sheeting from two different mills. Both sheetings are 64/68—3.5—36" materials, but it is obvious that buffs made from the material in Figure 1 will be less apt to fray in use and will hold the buffing composition better. The addition of a supplier's brand name to the specification for the material desired is an assurance of obtaining uniform quality and performance. A buff manufacturer with an established reputation cannot afford to let the performance characteristics of his products vary from order to order or even from year to year. This is difficult to guarantee, but reliable suppliers succeed in effecting it despite many obstacles.

The relatively small commercial volume of cotton materials used in the buff manufacturing trade makes it uninteresting to textile mills to weave cotton fabrics specifically for use in the manufacture of buffs. The buff manufacturers, therefore, must select standard mill fabrics that their tests have proved satisfactory for use in buffs. Obviously, this is not an ideal arrangement. It results in buff manufacturers being forced to compromise between characteristics required for buff performance and assurance of continued supply. Thus, material contracts are placed with large mills producing nationally advertised brands of cotton sheetings rather than with small mills producing job lots of special materials. Knowledge of the integrity and history of his material suppliers and sound contracts with them are necessary to the buff manufacturer who maintains uniform quality in his products.

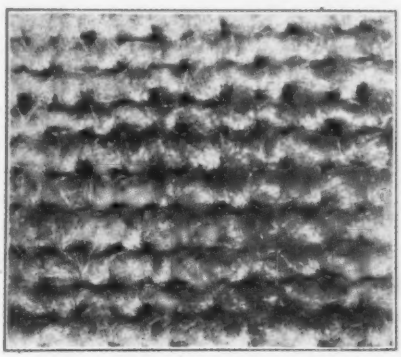


Figure 1. 64/68—3.5—36".

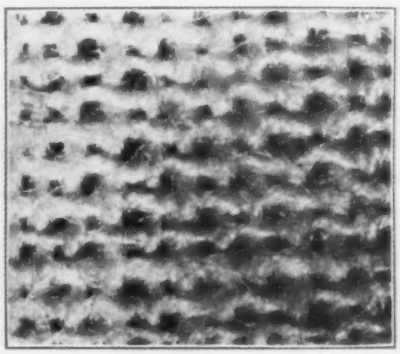


Figure 2. 64/68—3.5—36".

Comparison of cotton sheetings

Heavy metal removal by buffing is called a "cutting down" operation. This includes removal of scratches, imperfections, and general initial smoothing of the surface. The final buffing operation, which brings up a lustre and removes the fine scratches left by the abrasive composition used in the preceding operation, is called "coloring." In general, a soft, loosely-woven sheeting for "cutting down." The correct material for a buffing operation can be

* Present address, c/o Oakite Products, Inc., New York, N. Y.

Figure 3. Full disc loose buff section.

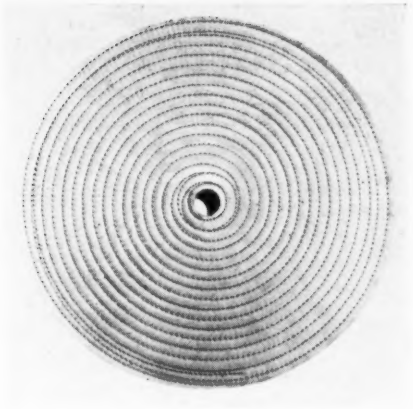


Figure 4. Spiral sewed buff section.

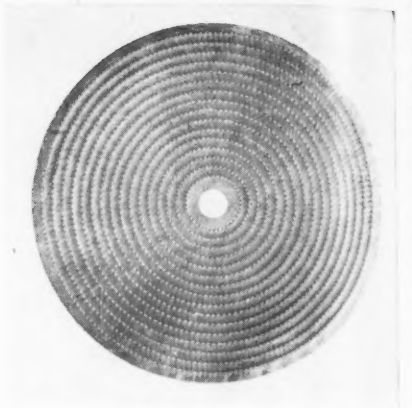


Figure 5. Concentric sewed buff section.

determined by trial of buffs made of the various grades of sheeting between the 48/48 and the 84/92. An experienced buffer can decide quickly, sometimes without trials, the type of material most satisfactory for a particular operation.

Both bleached and unbleached sheeting are used in the manufacture of buffs. A bleached material is usually harder and firmer than the unbleached. (This is due to the shrinkage of the yarn and the sizing and finishing treatments applied after the bleaching operation.) As a result, bleached sheetings are used generally in "cutting down" operations rather than coloring.

Full Disc Buffs

As stated earlier, a simple buffing wheel can be made by assembling a number of fabric discs, with a center hole, between flanges on a lathe spindle. In the trade, buff sections, rather than individual discs are supplied to build up buffing wheels to the required face width. A standard full disc loose buff section is prepared by assembling 20 discs of sheeting, two at a time, on a rotating table. (This varies the relation of the weave in adjacent discs and insures uniform face wear.) The assembled and turned discs are bound together into a section by one row of sewing around the center hole or arbor hole. (A typical Full Disc Loose Buff Section is shown in figure 3.) It can be seen that a soft, adaptable buffing wheel can be made from these sections. In use on a lathe, the individual discs or plies of fabric in the buff rotate in planes perpendicular to the axis of the spindle due to centrifugal force. The pressure exerted by holding an object against the rotating wheel tends to overcome the effect of the centrifugal force and it is possible to adapt the face of a full disc, loose buffing wheel to the contours of an article. To some extent, this type of buff, when constructed of hard, closely woven, high-thread count sheeting, can be used for "cutting down" operations on softer materials. When constructed of softer, loosely woven, lower-thread count fabrics, they provide ideal "coloring" buffs.

Sewed Full Disc Buffs

Full Disc Buff sections can be obtained in a variety of sewings to obtain the degree of stiffness or hardness, and flexibility required. Each type of sewing imparts certain characteristics to the action of a buffing wheel. An experienced buffer can recognize the presence or absence of these characteristics by the "feel" of the wheel on which he is working. However, he, like the buff manufacturers, finds it difficult to describe or evaluate exactly the effects of the type of sewing, number of stitches per inch, distance between rows of sewing, or their effect on each other.

All types of sewing increase the hardness and decrease the flexibility, or adaptability, of a buff section, but no numerical scale has been obtained to measure these qualities. Observations in the field have shown that it is possible to obtain the same degree of effective hardness in a buffing wheel with different combinations of spacing between rows of sewing and the stitches per inch. Thus, a buffing wheel with sewing $\frac{3}{8}$ inch between rows and 8 stitches per inch might be equal, in use, to another buff of the same material and diameter with $\frac{1}{4}$ inch spacing and 4 stitches per inch. If a quantitive method were available to check this observation and other similar findings, elimination of many special orders for sewing on buffs might be possible. At present, the basis of acceptance is the individual buffer's personal reaction to the "feel" and performance of a wheel. It is necessary, therefore, to "custom tailor" buffs to his specifications, even though a simpler construction might be available at lower cost. A comprehensive investigation, to study and measure the effects of various fabrics and sewings in buffing wheel performance, should result in savings in costs of manufacturing by decreasing the varieties of special buffs, and might indicate the possibilities and direction for approach to improvement of buffing techniques.

Among the commercially available types of sewing are Spiral, Concentric, Square, and a number of special styles. Figure 4 illustrates a Spiral Sewed Buff Section. Figure 5 shows a Concentric Sewed Buff Section. Figure 6 is a Square Sewed Buff Section. Figures 7 and 8 illustrate some of the special sewings available.

When ordering full disc, sewed buff sections the type of sewing, the space between rows of sewing, the fabric, the diameter of section desired, the arbor hole dimension, and the number of ply per section must be specified. This information is essential to prompt filling of orders.

Applications of Various Full Disc Buff Sewings

It would be a definite contribution to industry if sufficient data were obtained to permit compilation of tables outlining the use or application of each type of buff sewing and fabrics. Unfortunately, no comprehensive study has been made in this important field. The benefits to be derived by both buff users and manufacturers seem to indicate the value of such a project. The average experienced buffer has acquired this information through experience. Unconsciously, he uses it

whenever a new piece of work is given to him to buff. He selects sections of certain type buffs from his stock, mounts them on a lathe, prepares the buff face, selects and applies composition to the buffing wheel and generally succeeds in producing an economical procedure for obtaining the finish specified with a minimum of deviations in buff selection from his original plan. Yet direct questioning of experienced buffers as to the exact uses they would recommend for the various types of buff sewings and fabric is disappointing and confusing. Vague and conflicting answers are the usual result. If these men could interpret, classify and record their knowledge as well as they apply it in practice, simplification and standardization of buffing practices would result.

As stated before, full disc, loose buffs are soft and not generally recommended for heavy "cutting down" operations. Therefore, the indications that a sewed buff is required are readily apparent when a full disc loose buffing wheel fails to provide efficient, fast cutting action. The many variations in buff sewings available tend to make the decision of the type to order confusing. For simplicity, let it be assumed that the correct fabric, buff diameter, lathe speed and buffing composition are known and the reader's sole problem is selection of the type of sewing. space between rows and length of stitch.

Spiral Sewing

Spiral sewing satisfactorily fulfils the requirements of the majority of applications, where a sewed buff is required. It has the advantage of being the least expensive type of commercial buff sewing, because it can be done on semi-automatic sewing machines. It has some limitations, which will be discussed later, but it is recommended as first choice unless previous experience has shown it to be unsuited for a particular operation. Experience with a buffing operation should indicate whether a standard $\frac{1}{4}$ inch or $\frac{3}{8}$ inch space between the rows of spiral sewing is required. The $\frac{1}{4}$ inch sewing provides a harder buff than the $\frac{3}{8}$ inch sewing and selection should be based on this fact. Initial orders should be for the manufacturer's standard stitch length. If the buffing wheels prove too hard, spiral sewing with a looser stitch (less stitches per inch), wider spacing, or both can be supplied. If too soft, spiral sewing with a finer stitch (more stitches per inch), or a closer ($\frac{1}{8}$ inch) spacing, or both are suggested. The variations in spacing between rows of sewing and in stitches per inch permit spiral sewing to fulfill most users' requirements. However, the off center nature of spiral sewing imparts an uneven degree of hardness to the face of a buffing wheel. This and the limitation to the degree of hardness and extreme softness available in the spiral contruction necessitated development of other types of sewing to meet customers' specifications.

Concentric Sewing

Concentric sewing finds considerable commercial application, despite its higher cost per row than spiral sewing. It has several advantages that justify its position in the trade. Unlike spiral sewing, it can impart a uniform degree of hardness to the face of a buffing wheel, eliminating a tendency to produce waves or "chatter" marks. This is an important consideration on some types of work. Concentric sewing is of interest to users requiring slightly more stiffness than obtainable in a full disc loose buff. A row or two of concentric sewing between the arbor hole and the face of the buff section frequently provides the additional hardness desired without serious loss of the flexibility that may be necessary. Since the charges for concentric sewing are based on the number of rows, the additional cost in these instances is slight for the improvement in buffing performance. Greater variation in spacing, location, and grouping of the rows of sewing is possible with concentric sewing, because it is not an automatic sewing operation. Each row of sewing is applied individually and the spacing and location of the rows can be arranged to suit specific requirements. This permits many special constructions, such as a wheel with a hard face and a soft center or a wheel with body stiffness and a soft, flexible face. It is not recommended that consideration be given to these special type constructions whenever a standard buff section fails to perform an operation satisfactorily. Trial of other standard fabrics, sewings, spacings, stitchings, buffing compositions and wheel speeds should be made before ordering expensive "specials", about whose performance nothing is known. It is suggested that the advice of the buff manufacturer's engineers be requested before deciding on special concentric sewings.

Square Sewing

Square sewing induces a degree of hardness or stiffness in a buff section that can not be effected by other types of sewing. It probably produces the hardest buff sections commercially available, yet square sewed buff sections in use have a resilient action that is immediately apparent to the buffer. They are recommended for heavy "cutting down" operations where high pressures are used to obtain maximum

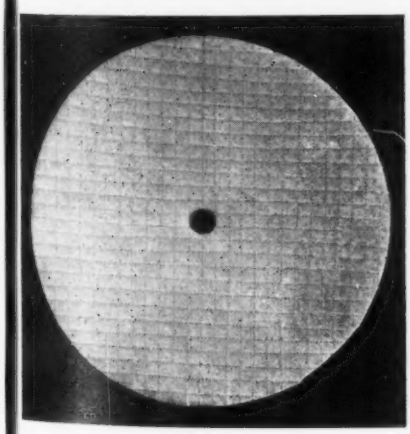


Figure 6. Square sewed buff section.

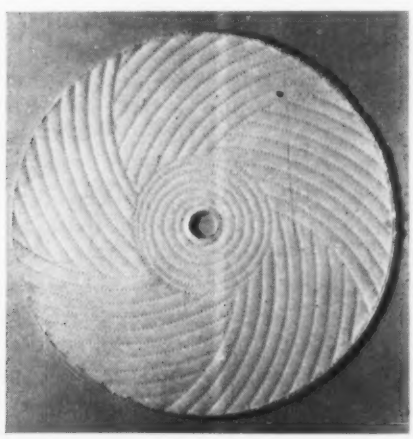


Figure 7. Kriss kross sewed buff section.

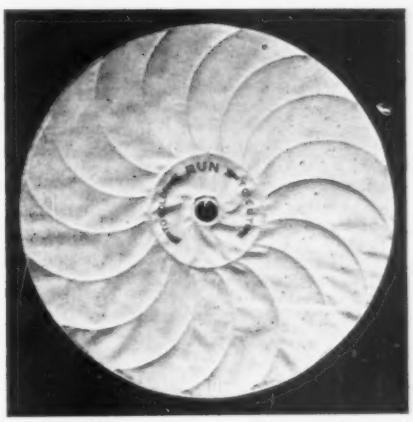


Figure 8. Creso sewed buff section.

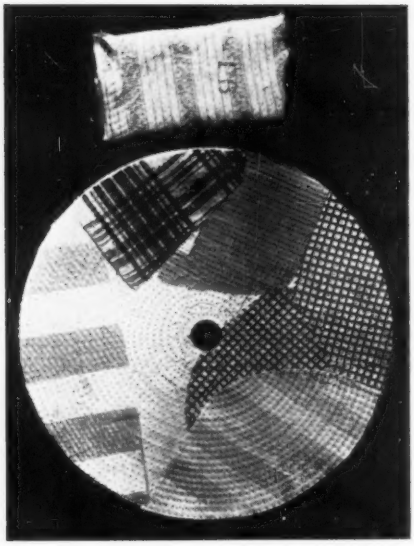


Figure 9. Sewed pieced buff section.
(outer cover and sewing removed)

metal removal. The aggressive cutting action of the square sewed buffing wheel is due largely to the effects of the rows of sewing terminating in the face of the wheel. The hard spots, produced by ends of the rows of sewing, are evenly distributed around the face and in between them are softer areas or "pockets" to hold the buffing composition. If spiral or concentric sewings do not provide the hardness and cutting action desired in a buff, square sewing, at a slightly higher cost per row of sewing, is suggested for active consideration.

Special Sewings

There are remote cases where standard sewings cannot be adapted satisfactorily to a customer's buffing operation. Upon demand, special sewings can be supplied to meet unusual requirements. Particular success with a special sewing may lead to recommendation of it in other similar operations. Eventually, it may become a standard sewing, but such cases are in the minority. Special sewings are costly and should not be considered unless proved necessary.

Sewed Pieced Buffs

In the manufactumre of full disc buffs, the individual discs are die cut from cotton sheeting. Geometrically, it is not possible to cut circles from square or oblong pieces of sheeting without waste at the intersections of the discs with each other and at the edges of the fabric. The shapes of this waste can be readily visualized by placing four coins together or two coins along a straight edge. Attempts to utilize these waste pieces of selected cotton sheeting, instead of selling them for rags, resulted in the manufacture of sewed pieced buffs.

Sewed pieced buffs are made by placing a one-piece fabric cover, or outside ply, on a table and cutting and fitting the small pieces of waste fabric jigsaw-puzzle fashion to build up individual layers or plies on it. When the required number of layers is completed, another one-piece fabric cover is placed on top. The assembly is then die cut into buff section of the specified diameter. The sections are carefully sewed from face to center to hold the small pieces firmly in place. Figure 9 illustrates an interior layer or ply of a sewed pieced buff section.

Sewed pieced buffs compare favorably with sewed full disc buffs in performance in many applications. Despite the additional cost of labor in-

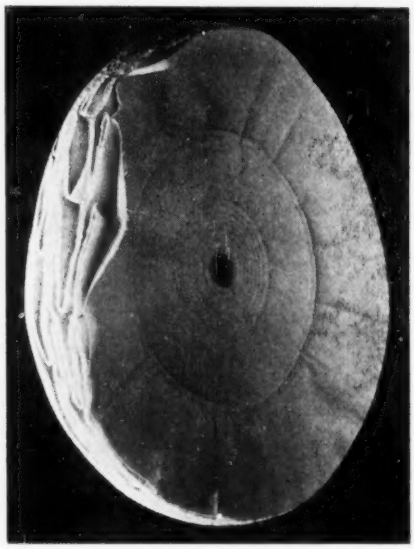


Figure 10. Folded ply buff section.

volved in "laying up" the small pieces, the saving in material costs, by using pieces of waste fabric, results in a substantial reduction in the price of sewed pieced buffs.

The demand for sewed pieced buffs exceeds the amount of waste pieces produced in full disc buff manufacture. To meet the requirements of the trade, buff manufacturers obtain selected mill ends of sheetings and other cotton fabrics from the textile mills and textile processors. This permits sewed pieced buffs to be obtained in fabrics that could not be economically used in full disc construction. Most of these materials are bleached and finished. (This explains the high percentage of sewed pieced buffs which are constructed of bleached fabrics). The mill ends used in sewed pieced buff construction are generally large oblong strips. These are more desirable than the small irregular pieces produced from die cutting full discs, because their straight edges facilitate "laying up" full, even layers or plies in assembling the "books" of fabric prior to die cutting. Careful sorting of the strips before "laying up" and accurate piecing into full layers tends to produce well-balanced, even-running, sewed pieced buffing wheels.

Sewed pieced buffs, like sewed full disc buffs, are recommended in applications where a hard, stiff buff suitable for "cutting down" operations is required. Pieced buffs cannot be obtained in as many varieties of sewings or with very wide spacings between rows of sewings because of the necessity of holding all the pieces securely in the buff section. The requirement for close spacing and complete rows of sewing from the center to the face of the sections generally limits the field of sewed pieced buffs to heavy "cutting down" operations where hard, stiff and less flexible buffs are demanded. Thus, the fact that the harder, bleached and finished fabrics are available for use in pieced buff construction is a fortunate circumstance.

The large volume of sewed pieced buffs sold and their continued use indicates that they must give satisfactory performance in many applications, in addition to offering the advantage of lower initial cost. Because the buyer cannot determine the quality of material used or the workmanship in fully piecing out each layer without ripping a section apart and destroying it, some unethical buff manufacturers have taken advantage of the trade. No buff manufacturer will guarantee that his

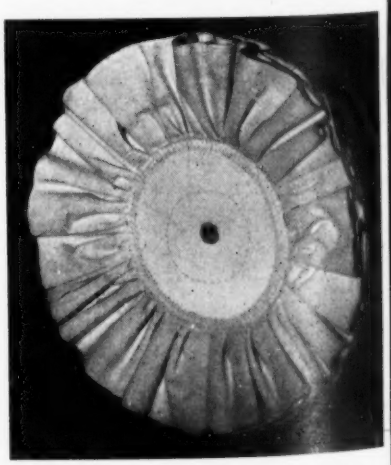


Figure 11. "Puckered" buff section.

sewed pieced buffs will run as smoothly or be as well balanced as full disc buffs. No buff manufacturer will state that an occasional piece of a sewed pieced buff might not come loose as the buff wears down or when a row of sewing is pulled out during "raking". However, it is the aim of reputable suppliers to produce sewed pieced buffs as nearly free from uneven running and loose pieces as possible.

Special Construction Buffs

With the advent of automatic buffing machines, it was found that neither full disc loose nor sewed buffs were entirely satisfactory for some operations. High speed production requirements demanded buffs with the fast cutting properties of sewed buffs. Desire to eliminate operations and expensive extra units of machinery demanded buffs with the flexibility of loose, full disc buffs to adapt themselves to contours of articles being buffed. Added to these requirements were demands for a buff capable of withstanding higher working pressures and speeds than encountered in hand buffing, without taking fire. Ability to hold more buffing composition on the face and in the buff was another requisite.

To some extent, the development of special construction buffs has fulfilled these antithetical requirements. Among the more successful types. Figure 10 illustrates a buff section with a folded-construction face portion and a sewed hard center. Another type is the "puckered", bias-cut fabric face buff section shown in Figure 11. In these buffs, the folding or puckering of the fabrics increases the stiffness and the cutting properties with small loss of flexibility or adaptability. These constructions also facilitate the adhesion of the buffing compositions and allow better penetration of the composition into the face of the buff. Thus "cutting" can be obtained when the buff face is turned over under the high pressures used in machine buffing. The nature of the folded or puckered constructions allows air spaces between the folds. Flexing of the buff in use permits exchange of the air in its interior and an opportunity for removing the heat generated by friction between the plies of fabric. A cooler-running buff is produced with subsequent increase in effective life. The bias-cut fabric type buff increases useful life by eliminating raveling at the face.

Many types of special construction buffs are available. Their selection should not be undertaken without the advice of the buff manufacturer's engineers. They have the experience and training to study special problems and make recommendations as to the type of buff and other factors involved.

Salvage By Electrodeposition

(*Concluded from page* 202)

5000 SFPM with the work speed at 75-100 SFPM. The operator should not exceed a cut depth of 0.0001-0.0002" for dry grinding nor 0.0005" for wet grinding. After grinding, lapping is usually the next operation. This can be done using cast iron laps with emery as abrasive or an aluminum disk wheel with levigated alumina abrasive.

In concluding the discussion of this particular phase of salvage work, it would seem advisable to remark that there are limitations to the use of hard chromium. It must be remembered that even in its best form, it is a brittle metal relatively difficult to grind and the most expensive of the three methods of salvage being reviewed, principally because it is deposited from a bath with a low current efficiency and comparatively low rate of deposition. In fact, the current efficiency of chromium deposition rarely exceeds 20%; in other words, at least 80% of the current is used in discharging hydrogen at the cathode. The atomic hydrogen and perhaps some of the molecular hydrogen produced affects the basis metal to an appreciative extent causing embrittlement. Even after suitable heat treatment following plating, this undesirable condition is not always relieved. In a recent War Metallurgy Committee release, the reports of several investigators on the subject of hydrogen embrittlement were discussed at length and it would seem in order to summarize their findings. One investigator reported the following:

(1) Hydrogen embrittlement increased hardness of the basis metal.

(2) The maximum susceptibility to embrittlement occurs in the tempering range of 500°-550°F.

(3) The higher the carbon content of the steel, the greater is the degree of embrittlement.

(4) Hydrogen embrittlement tends to dissipate itself at room temperature but can be hastened by heating.

(5) In relieving embrittlement, temperature is a more potent factor than time.

(6) Hydrogen embrittlement becomes more severe as the cross-section of the metal is decreased.

(7) In heat-treated metals, not cold worked, whose hardness is Rockwell C 40 or less, embrittlement by hydrogen is negligible.

Further conclusions were drawn by other investigators. They are as follows:

(1) The composition of the steel affects the degree of embrittlement.

(2) In general, unalloyed plain carbon steels are more subject to embrittlement by chromium plating than are alloy steels.

(3) Heating after plating relieves the embrittlement in most, but not all, cases.

(4) High speed steels of the tungsten - chromium - vanadium type are as readily embrittled as plain carbon steels.

(5) The low-alloy, oil-hardening steels are embrittled less than the plain carbon and high-speed steels in chromium plating.

(6) The silicon steels are virtually unaffected by the plating.

(7) Low-alloy, oil-hardening steels are best suited for plating.

The Antiquity of Tools

By JOSEPH DANFORTH LITTLE

PART IV

The Shield of Achilles

TO APPRECIATE the hammer as an independent tool, one might read in the Iliad of Homer (Book 18, the last 150 lines) a description of the famous shield of Achilles. One may read either the original description of the metal work on the shield, in the language of Homer himself, or failing in the ability to do that, he will be amply repaid by a thoughtful perusal of a translation. Homer flourished about 960 B.C. or about 2900 years ago. Although the shield may not have been actually fashioned, nevertheless the description is of that which a tool known as the hammer was poetically supposed capable of accomplishing.

The Earl of Derby gives a description of the forge at which Vulcan wrought:

"The bellows then directing to the fire
He bade them work, thro' twenty pipes at once
Forthwith they pour'd their diverse-tempered blasts;
Now briskly seconding his egar haste,
Now at his will, and the work required.
. . . . . .
Then on its stand his weighty anvil placed
And with one hand the hammer's pond-rous weight
He weilded, while the other grasp'd the tongs
And first a shield he fashioned vast and strong
With rich adornment . . . . . .
Of five folds the shield was form'd
And on its surface many a rare design
Of curious art his practis'd skill had wrought."
(Book 18, beginning at line 528)

The account of the shield itself is too long to give but the following gives the incidents embossed upon it by hammering and inlaying. The scenes wrought upon the shield are:

1. The earth, sea and heavenly bodies.
2. In a city at peace there are
   a. Marriage festivities
   b. A judicial suit or trial
3. In a city at war there are
   a. A scene before the ramparts
   b. An ambush and surprise
   c. A bloody fight
4. The ploughing of a field
5. The harvest and the meal in preparation
6. The vintage, with music and a march
7. A herd of cattle attacked by lions
8. Sheep at pasture
9. The dance
10. The great ocean river encompassing the whole as, in the mind of Homer, it encompassed the earth.

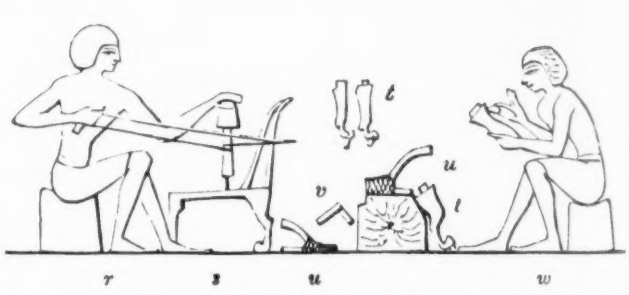
The late William E. Gladstone, commenting on this, said, "Never was outward fact so glorified by the muse. Nowhere in poetry is there such an accumulation of incidents without crowding. Of the twelve pictures on the shield almost every one contains a narrative."

All this is described as the result of hammer work by one who lived about 960 B.C. and tools at that period were crude. This account of Homer's proves the art of working the various substances of which the shield was made, copper, tin, gold and silver, to have been understood at that time, and the skill required to represent the infinity of subjects he mentions, was something no ordinary artisan could possess, and unless similar works had been already made, the poet would not have ventured on the description he has given.

The Drill

One of the interesting mechanical devices was the early drill. Rotary motion in blades for boring was first secured by twirling the drill handle between the palms. Then came the idea of twisting a string around the handle and obtaining the whirling motion by pulling the string, and later the bow was invented and used by giving its string a turn around the shaft of the drill to produce rotation. The old drillers had one of the crudest of early tools with which to accomplish their work, yet their methods are still practiced in some parts of China and Palestine.

The method of drilling was very much like the manner in which our early American Indians made their fire by friction. The wood or stone to be drilled was held in place by one foot while the handle of the drill was held in one hand



Egyptian Carpenters.

r, drilling hole in seat of a chair, s.
v, a carpenter's square.
tt, legs of chairs.
uu, adzes.
w, man planing or polishing leg of chair.

and a bow with a loose leather throng looped once around the drill was moved back and forth with the other. Today, when drilling holes to any extent in the regular line of manufacture, a workman selects the size of drill or bit he desires, inserts it in a power drill, places his piece of work in position, turns on the electric motor, and it hums along as he steps on a pedal, the hole being bored in a few seconds. In Assyria a drill brace fitted with a flint drill was in use about 7000 B.C. and it is therefore probable that some similar instrument was used by the Egyptians for drilling the eyes of their needles. The crank drill with stone fly-weights was invented in Egypt between 3400 B.C. and 3000 B.C.

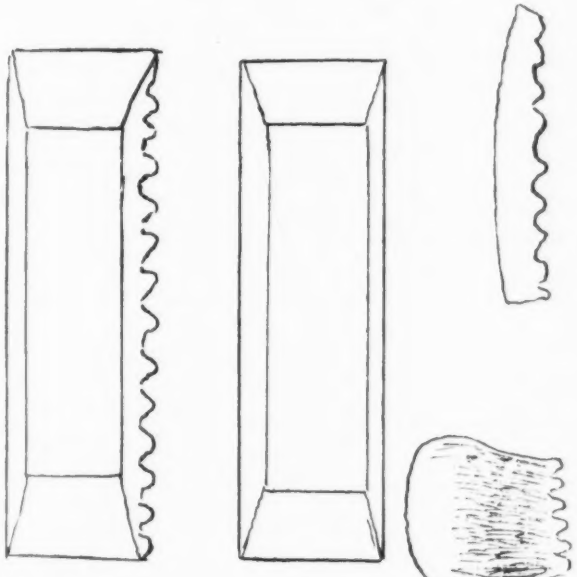
No tool in the Egyptian cabinet maker's basket will be looked at with more curiosity and respect than his drill. It is clearly and unmistakably figured on the illustration of the cabinet maker drilling the frame of a chair for weaving in the seat. In many respects it resembles the drill of today. The Egyptian artisan has his hand on the top of the drill spindle and is pressing it forward, much as we today press a drill. The other hand works the bow. In the illustration

there appears a large block on which the hand rests and in which the drill spindle rotates. This we are told is the palm nut, the fruit of the Heban Palm, which, as soon as it ripens, becomes exceedingly hard and capable of receiving a high polish and very naturally was used in these early days by carpenters.

These chairs must have been well formed, for there are no cross rails to bind the legs and the whole framework is as dependent upon the joints of the seat as is the case in many of our best made chairs. Bear in mind, these chair-makers hark back to the time when Joseph and the children of Israel were in Egypt. The skill in designing and constructing, not only chairs but cabinets and other articles of general household furniture, was remarkable. Dovetailing, on which we now rely and for which we have so many contrivances for accomplishment by machinery, was known and practiced by the ancient Egyptians, and to accomplish this they must have had many remarkable tools.

The Saw

The origin of the saw is lost in the long-forgotten centuries, but we know that the saw is quite as old as the knife. The first carpenter's saw was merely a blade roughly hacked on the edge. Saws in their prehistoric infancy were mostly of stone. Flint was largely used; the blade, or slab or chunk being roughly hewn and the teeth chipped out in a somewhat very irregular manner. The development of the saw was very slow and countless shapes and styles were employed. It was not until the frame saw with a metal blade was used that sawing became anything but a long and



Agate Saw. *Agate Knife.* *Flint Saws.*
Mesopotamian Tools; 4000 B.C. *Egyptian*; 5000 B.C.

arduous task.

In the British Museum there is a flint saw which dates back to before 5000 B.C. It is only three inches long and about one-half an inch deep, and from the size it is probable that it was fitted with some sort of a handle, for without this its use would have been difficult. Later flint saws had handles, the earlier ones being straight while the later ones were carved. These have been found in Egypt. In Mesopotamia agate saws have been found consisting of a bevelled slab about six inches long with a serrated edge. Tools used in the construction of the Tabernacle, about 1490 B.C., were doubtless Egyptian or Phoenician, probably the former.

The Chisel

The chisel is one of the oldest tools in the world. Chisels have been found buried in mounds that were made by men who lived long before history began to be recorded. Pictures on old monuments show plainly that the ancient Egyptian carpenter had a chisel among his tools and used it with a mallet or a flat stone used as a hammer. The plane of today is simply a chisel, surrounded with a metal or wooden frame, with the cutting edge of the chisel projecting through the bottom of the frame. A very common tool of prehistoric man was the scraper, in many sizes and shapes, which he used for cleaning the skins of animals he killed and which were made into cloths. He also used these for scraping the bark from trees and logs. These scrapers were really the forerunners of our chisels and planes. Man at this period learned to use bone, horn and ivory for awls and drill points and to bore holes in shells, which he used for ornaments. These splinters of bone were primitive drilling tools and the forerunners of the awl.

Coming down to the tenth century of our own era we find that clocks were being made in Germany and two centuries later they were made in England. These called for a new class of tools, tools constructed with much greater neatness and refinement. The discovery of coal and the invention of the steam engine marked a new epoch in the application of power to tools. The invention of electric generators and the introduction of compressed air devices made possible the application of power to small and isolated tools inaccessible to direct steam drive. Tools used in mining and in quarrying and tools employed in family kitchens illustrate the new fields opened by these auxiliary forms of power. The old standard for plowing used to be one acre per man a day. Today with our up-to-date tractor-hauled gang plows it is possible to cover twenty to thirty acres per man per day.

In very early days there was little in the cutting tools of that period to suggest hand-craft mastery, or, indeed, anything which might be called a developed technique of manufacture. The earliest metal work found its development in jewelry, and it retained its decorative features as it applied to tools and weapons. Ancient swords, daggers, and knives vie with bowls, vases and breastplates and the like, as objects of art and the skill and joy of the craftsman found increasing outlet in a growing variety of forms and material with which he could work.

We have considered the workman at his task down through the ages, how his tools came into existence and how they have changed and improved. The machines of today have taken the place of many of the old style tools, nevertheless certain hand tools are used and will be as long as men work and create. Without tools there could be no machines, for it is tools and men who make them that build machines.

The machine age has to a very great extent caused the abandonment of the hand-made tools and decoration in metals such as were made or executed by the craftsmen of old. Nevertheless the mastery of the technique of manufacture has increased tremendously and the finished product shows an almost incredible advance in design and perfection of manufacture.

(*Concluded on page 233*)

Systematic Identification of the Common Metallic Coatings

By HOWARD NECHAMKIN and ALVIN SANDERS

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THE testing of an unknown metallic finish for identification of the metal which has been used for plating has not, to the authors' knowledge, been systematized. The series of reactions developed by the authors is designed to eliminate guesswork and to provide a simple and logical procedure for establishing the identity of the metallic coating. The method applies to the following commonly used metals: chromium, tin, nickel, gold, silver, rhodium, zinc, cadmium, copper, aluminum, and lead. This procedure is particularly adapted to a laboratory which is engaged in the testing of consumer articles where merchandise like umbrella handles, cooking utensils, fountain pens and pencils, novelty jewelry, hardware, metallic toys, trays for various purposes, etc., is submitted for the purpose of identifying the metallic coating.

Before testing is begun, any lacquer which may cover the surface of the metal must be removed, using a mixture of equal parts of ethanol and acetone on a piece of absorbent cotton. The cleaned area is then subjected to the series of spot tests described in this article. Each reagent is added on a separate spot, and no reactions are carried through beyond one step unless specifically directed. Because never more than one drop of reagent is added, it is recommended that the reagents be kept in a set of 60-ml. dropping bottles for convenience. In the special cases where a spot on a filter paper must be rendered ammoniacal, the paper is held over the mouth of a bottle of concentrated ammonium hydroxide solution for about 30 seconds.

Sometimes, the reactions of the reagents with the metal surfaces are extremely slow. In these cases it is advisable to roughen the surface by rubbing very lightly with fine emery cloth (No. 000) or sandpaper (No. 00) before adding the reagent, taking care to keep away from the base metal, since that may greatly interfere with the proper interpretation of the results. The authors have found the use of a small magnifying glass very helpful for observing reactions.

In Table I and outline, the term "colored" is used for metals which do not have the familiar "silvery" appearance of aluminum, lead, etc.

Reagents

Nitric acid, equal parts of 37 per cent nitric acid and distilled water. Hydrochloric acid, 35 per cent (concentrated). Ammonium hydroxide, 28 per cent ammonia (concentrated). Sodium sulfide, 10 per cent aqueous solutions. Cacotheline. Dimethylglyoxime, 0.6 gram in 50 ml. of 95 per cent ethanol. Sodium hydroxide, 10 per cent aqueous solution.

Procedure

I. Colored plating. Add one drop of nitric acid.

  A. A blue solution is obtained: Copper, brass, or other alloys of copper.

  B. Action is delayed, or no reaction occurs: Gold.

II. Colorless plating. Add one drop of nitric acid to plating and if reaction is slow, wait 2 minutes.

  A. Plating is not attacked. Add one drop of sodium hydroxide to a new spot.

    1. Plating is attacked: Aluminum.

    2. Plating is not attacked. Add concentrated hydrochloric acid and take up after a few seconds on filter paper.

(*Concluded on page* 218)

TABLE I. PROCEDURE FOR CHROMIUM, NICKEL, TIN, GOLD, SILVER, RHODIUM, ZINC, CADMIUM, COPPER, ALUMINUM, AND LEAD

Colorless Plating: Add Nitric Acid and Wait 2 Minutes if Reaction Is Slow

Plating Not Attacked: Rh, Al, Cr. Add NaOH

Plating attacked: Aluminum

Plating not attacked: Rh, Cr. Add HCl

Green solution: Chromium

No action: Rhodium (Pt metals)

Plating Attacked, Giving Green Solution: Cr, Ni. Add HCl, take up on filter paper, render ammoniacal. Add dimethylglyoxime solution

Red color on paper: Nickel

No red color on paper: Chromium

Plating Attacked without Giving Colored Solution: Sn, Ag, Zn, Cd, Pb: Cacotheline Test

Positive (violet): Tin

Negative: Ag, Zn, Cd, Pb. Add HNO_3, take up on filter paper, render ammoniacal, add sodium sulfide

White or no Color: Zinc

Bright yellow: Cadmium

Brown-black: Ag, Pb. Add nitric acid, take up on filter paper, add NaOH

Brown-black: Silver

White: Lead

Colored Plating: Add Nitric Acid

Blue solution: Copper, brass, other copper alloys

Reaction delayed or does not occur: Gold (confirm with microscope)

(*Reprinted with permission from the Analytical Edition, "Industrial and Engineering Chemistry", November* 15, 1942).

Dictionary of Metal Finishing Chemicals

These pages comprise the sixteenth installment of the dictionary of chemicals used in the finishing industry.

This feature will continue to be a regular part of *Metal Finishing* until all related materials have been reviewed in alphabetical order.

Sodium Chloroaurate: See Sodium Gold Chloride.

Sodium Chloroplatinate: $Na_2PtCl_6 \cdot 6H_2O$. Mol. wt. 562.06. Sp. gr. 2.50. Triclinic yellowish-red prismatic crystals. Loses water of crystallization at 100°C. Very soluble in water. Soluble in alcohol. Grades: Technical, C. P. Containers: Bottles (1 g., ½, 1 oz.).

Sodium Chlororhodate: $Na_3RhCl_6 \cdot 18H_2O$. Mol. wt. 708.93. Dark red monoclinic prism crystals. Decomposes when heated. Very soluble in water. Insoluble in alcohol. Grades: Technical. Containers: Bottles (½, 1 oz.).

Sodium Chloride: NaCl. Mol. wt. 58.454. Sp. gr. 2.163. M. P. 804°C. Also known as Table Salt, Common Salt, Sea Salt, Bay Salt. Colorless cubic crystals or white crystalline powder or granules. Solubility, 36 at 0°C. and 40 at 100°C. Soluble in glycerine. Insoluble in hydrochloric acid. Slightly soluble in alcohol. Grades: Crystals, Granules, fused-Technical, U. S. P., C. P. Containers: Bottles, Cartons (1, 5 lb.); Kegs (25, 50, 100 lb.); Bags (100, 200 lb.); Drums (100 lb.); Barrels (250, 280, 350 lb.); Bulk.

Sodium Chromate: $Na_2CrO_4 \cdot 4H_2O$. Mol. wt. 234.06. Sp. gr. 2.71. Monoclinic yellow deliquescent needles, prisms or powder. Loses two molecules of water at 110°C. and four molecules at below 250°C. Solubility, 46.08 at 25°C. and 55.23 at 65°C. Slightly soluble in alcohol. Grades: Technical, C. P. Containers: Bottles, Cans (1, 5 lb.); Wood Kegs.

Sodium Chromate, Anhydrous: Na_2CrO_4. Mol. wt. 162.00. Also known as Sodium Chromate, Fused. Yellow powder. Soluble in water. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Kegs, Boxes (25 lb.); Drums (100 lb.); Barrels (400, 425 lb.); Casks (700 lb.).

Sodium Chromate, Fused: See Sodium Chromate, Anhydrous.

Sodium Citrate: $2Na_3C_6H_5O_7 \cdot 11H_2O$. Mol. Wt. 714.358. Sp. gr. 1.86. Rhombic white crystals, granules or powder. Loses water of crystallization when heated to 150°C. Decomposes at higher temperatures. Solubility, 91 at 25°C. and 250 at 100°C. Slightly soluble in alcohol. Grades: Technical, U. S. P., C. P. Containers: Bottles (1, 5 lb.); Cans (1, 5, 10, 25, 50 lb.); Kegs (100 lb.); Barrels (225, 250, 260, 275 lb.); Drums (50, 100 lb.); Boxes (25 lb.).

Sodium Copper Cyanide: See Sodium Cuprocyanide.

Sodium Cuprocyanide: $NaCu(CN)_2$. Mol. wt. 138.60. Sp. gr. 1.01. Also known as Sodium Copper Cyanide. Colorless crystals or white powder. Decomposes at 100°C. Soluble in water.

Sodium Cyanide: NaCN. Mol. wt. 49.015. M. P. 564°C. B. P. 1496°C. Also known as Cyanide. Cubic, colorless, delinquescent crystals, white crystalline powder, granules, white eggs. Soluble in water. Slightly soluble in alcohol. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Cans and Drums (1, 5, 10, 25, 50, 100, 200 lb.).

Sodium Cyanoaurate: See Sodium Gold Cyanide.

Sodium Dichromate: $Na_2Cr_2O_7 \cdot 2H_2O$. Mol. wt. 298.85. Sp. gr. 2.52. Deliquescent red monoclinic crystals or granules. Also known as Sodium Bichromate. Loses water of crystallization when heated to 100°C. Decomposes at 400°C. Very soluble in water. Insoluble in alcohol. Grades: Technical, C. P. Containers: Bottles and Cans (1, 5 lb.); Boxes (25 lb.); Kegs and Drums (25, 100 lb.); Paper and Burlap Bags (100 lb.); Barrels (300, 350, 400 lb.); Cases (700 lb.).

Sodium Dichromate, Anhydrous: $Na_2Cr_2O_7$. Mol. wt. 262.01. M. P. 320°C. Also known as Fused Sodium Dichromate, Fused Sodium Bichromate. Reddish orange powder. Solubility, 180 at 20°C. and 433 at 98°C. Insoluble in alcohol. Grades: Technical, C. P. Containers: Bottles and Cans (1, 5 lb.); Boxes (25 lb.); Kegs and Drums (25, 100 lb.).

Sodium Dihydrogen Phosphate: See Sodium Phosphate Mono.

Sodium Dioxide: See Sodium Peroxide.

Sodium Ferricyanide: $Na_3Fe(CN)_6 \cdot H_2O$. Mol. wt. 298.97. Also known as Red Sodium Prussiate, Red Prussiate of Soda. Red deliquescent crystals Solubility, 19 at 0°C. and 67 at 100°C. Insoluble in alcohol. Grades: Technical. Containers: Bottles (1, 5 lb.); Kegs (100 lb.).

Sodium Ferrocyanide: $Na_4Fe(CN)_6 \cdot 12H_2O$. Mol. wt. 520.14. Sp. gr. 1.458. Also known as Yellow Sodium Prussiate, Yellow Prussiate of Soda. Monclinic yellow crystals. Solubility, 32 at 20°C. and 161 at 98°C. Insoluble in alcohol. Grades: Technical, Purified, C. P. Containers: Bottles and Cans (1, 5 lb.); Boxes (5, 25 lb.); Kegs (100 lb.); Barrels (335, 500 lb.).

Sodium Fluoride: NaF. Mol. wt. 42.00. Sp. gr. 2.79. M. P. 980°C. Colorless tetragonal or cubic crystals or white powder. Slightly soluble in water. Very slightly soluble in alcohol. Grades: Technical, Purified, C. P. Containers: Bottles and Cartons (1, 5 lb.); Boxes (10, 25, 50 lb.); Drums (100 lb.); Kegs (100, 125 lb.); Barrels (350, 375 lb.).

Sodium Fluosilicate: See Sodium Silicofluoride.

Sodium Formate: NaCHOO. Mol. wt. 68.015. Sp. gr. 1.92. M. P. 253°C. Deliquescent, colorless monoclinic crystals or crystalline powder. Decomposes at higher temperatures. Solubility, 44 at 0°C. and 160 at 100°C. Slightly soluble in alcohol. Grades: Technical, Purified, C. P. Containers: Bottles (1, 5 lb.); Boxes (50 lb.); Bags (100 lb.); Kegs (125 lb.); Barrels (250 lb.).

Sodium Gold Chloride: $NaAuCl_4 \cdot 2H_2O$. Mol. wt. 398.1. Also known as Sodium Chloraurate. Solubility, 150 at 10°C. and 990 at 60°C. Yellow rhombic crystals. Soluble in alcohol. Grades: Technical, U. S. P. Containers: Bottles (15 g., ½, 1 oz.).

Sodium Gold Cyanide: $NaAu(CN)_2$. Mol. wt. 272.2. Also known as Sodium Aurocyanide and Sodium Cyanoaurate. White crystalline powder with yellowish tinge. Soluble in water. Grades: Technical. Containers: Bottles (½, 1, 4, 10 oz.).

Abbreviations: Mol. wt. = Molecular Weight; Sp. gr. = Specific Gravity; M. P. = Melting Point; B. P. = Boiling Point; Solubility figures, where given, are parts by weight in 100 parts of water; Technical = Grade usually used for industrial purposes; Purified or Pure = Better grade than Technical; U. S. P. = Conforms to standards of U. S. Pharmacopoeia; C. P. = Chemically pure, exceeding requirements of the U. S. P.; N. F. = Meets requirements of the National Formulary.

Sodium Hexametaphosphate: $(NaPO_3)_6$. Mol. wt. 611.86. Sp. gr. 2.5. M. P. 616°C. Also known as Sodium Metaphosphate, Graham's Salt, Calgon. Clear glass, flake or white powder. Decomposes at melting point. Soluble in water. Grades: Technical. Containers: Bags, Cartons, Drums, Barrels.

Sodium Hydrate: See Sodium Hydroxide.

Sodium Hydroxide: NaOH. Mol. wt. 40.005. Sp. gr. 2.130. M. P. 318°C. B. P. 1390°C. Also known as Caustic Soda, Sodium Hydrate, Soda Lye. White Caustic, Lye. White deliquescent lumps, sticks, pellets, flakes. granules or solid. Solubility, 42 at 0°C. and 347 at 100°C. Very soluble in alcohol and in glycerine. Grades: Technical, Purified, U. S. P., C. P., C. P.-special. Containers: Bottles (1, 5 lb.); Cans (1, 5, 10, 25, 50 lb.); Drums (100, 110, 400, 415, 650, 725 lb.); Kegs (55 lb.); Cases (112 lb.); Drums (solution) (110 gal.); Tank Cars (solution).

Sodium Hydrosulfite: $Na_2S_2O_4 \cdot 2H_2O$. Mol. wt. 210.15. Colorless crystals or anhydrous white powder. Decomposes when heated. Solubility, 25 at 20°C. Decomposes in hot water. Decomposes in acids. Soluble in alkalies and cyanides. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Tins (5, 10, 25, 50, 100 lb.); Drums (125, 250 lb.).

Sodium Hyposulfite: See Sodium Thiosulfate.

Sodium Iodide: NaI. Mol. wt. 149.92. Sp. gr. 3.67. M. P. 651°C. Cubic colorless crystals. Solubility, 159 at 0°C. and 257 at 60°C. Very soluble in alcohol. Grades: Technical, U. S. P., C. P. Containers: Bottles (1, 5 lb.); Jars (25, 50 lb.).

Sodium Meta-Phosphate: See Sodium Hexametaphosphate.

Sodium Meta-Vanadate: $NaVO_3$ Mol. wt. 121.95. M. P. 630°C. Colorless monoclinic prismatic crystals. Soluble in water. Grades: Technical. Containers: Bottles, Cartons.

Sodium Molybdate: $Na_2MoO_4 \cdot 2H_2O$. Mol. wt. 241.98. M. P. 687°C. Rhombohedral white crystals, crystalline plates. Solubility, 56 at 0°C. and 116 at 100°C. Grades: Technical, Purified, C. P. Containers: Bottles (1, 5 lb.); Boxes (25 lb.); Kegs (100 lb.); Barrels (400 lb.).

Sodium Monosulfide: See Sodium Sulfide.

Sodium Nitrate: $NaNO_3$. Mol. wt. 85.005. Sp. gr. 2.26. M. P. 308°C. Also known as Soda Niter, Chile Saltpeter, Chile Saltpetre, Chile Niter, Chile Nitrate. Colorless trigonal crystals, white powder, granules and sticks. Decomposes at 380°C. Solubility, 73 at 0°C. and 180 at 100°C. Slightly soluble in alcohol. Grades: Technical, Refined, U. S. P., C. P. Containers: Bottles and Cartons (1, 5 lb.); Cartons (25 lb.); Kegs and Drums (100 lb.); Bags (100, 150, 200 lb.); Barrels (375, 400, 450 lb.); Bulk.

Sodium Nitrite: $NaNO_2$. Mol. wt. 69.005. Sp. gr. 2.17. M. P. 271°C. Hygroscopic colorless rhombic crystals, white granules and sticks with slightly yellowish tint. Decomposes at 320°C. Solubility, 72 at 0°C. and 163 at 100°C. Grades: Technical, U. S. P., C. P. Containers: Bottles (1, 5 lb.); Cans (25, 50 lb.); Boxes (25 lb.); Kegs (100, 125 lb.); Barrels (400, 425, 500, 600, 700 lb.).

Sodium Orthophosphates: See Sodium phosphates.

Sodium Oxalate: $Na_2C_2O_4$. Mol. wt. 133.994. Colorless crystals or white crystalline powder. Solubility, 3.7 at 20°C. and 6.3 at 100°C. Grades: Technical, Purified, C. P., C. P.-special. Containers: Bottles and Cartons (1, 5 lb.); Boxes (25 lb.); Kegs (100 lb.); Barrels (225, 300 lb.).

Sodium Perborate: See Sodium Borate-Per.

Sodium Perchlorate: $NaClO_4 \cdot H_2O$. Mol. wt. 140.470. Sp. gr. 2.02. Rhombohedral, colorless, deliquescent crystals. Decomposes when heated above 480°C. Very soluble in water. Soluble in alcohol. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.).

Sodium Peroxide: Na_2O_2. Mol. wt. 77.994. Sp. gr. 2.805. Also known as Sodium Dioxide. Yellow Powder. Decomposes when heated. Soluble in cold water. Decomposes in hot water. Soluble in dilute acids. Insoluble in alcohol. Grades: Technical, Purified, C. P., C. P.-special. Containers: Cans (1, 5, 10 lb.); Pails (75 lb.); Drums (400 lb.).

Sodium Phosphate-Di: $Na_2HPO_4 \cdot 12H_2O$. Mol. wt. 358.17. Sp. gr. 1.52. M. P. 34.6°C. Also known as Dibasic Sodium Phosphate, Disodium Acid Phosphate, Disodium Orthophosphate, Secondary Sodium Phosphate. Colorless rhombic or monoclinic efflorescent crystals, granules, and anhydro white powder. Loses water of crystallization at 100°C. Solubility, 6.3 at 0°C. Infinitely soluble at 100°C. Insoluble in alcohol. Grades: Technical, U. S. P., C. P. Containers: Bottles and cartons (1, 5 lb.); Boxes (25, 50 lb.); Kegs and Drums (100, 125 lb.); Bags (175, 200 lb.); Barrels (275, 300, 350, 400, 500 lb.).

Sodium Phosphate-Dibasic: See Sodium Phosphate-Di.

Sodium Phosphate-Meta: See Sodium Hexametaphosphate.

Sodium Phosphate-Mono: $NaH_2PO_4 \cdot H_2O$. Mol. wt. 138.01. Sp. gr. 2.040. Also known as Monobasic Sodium Phosphate, Sodium Acid Phosphate, Sodium Biphosphate, Mono-Sodium Orthophosphate, Sodium Dihydrogen Phosphate, Primary Sodium Phosphate. Colorless rhombic crystals. Decomposes when heated to 200°C. Solubility, 112 at 20°C. and 448 at 99°C. Insoluble in alcohol. Grades: Technical, Purified, U. S. P., C. P. Containers: Bottles (1, 5 lb.); Boxes (25, 50 lb.); Kegs (100 lb.); Barrels (400 lb.).

Sodium Phosphate-Monobasic: See Sodium Phosphate-Mono.

Sodium Phosphate-Primary: See Sodium Phosphate-Mono.

Sodium Phosphate-Secondary: See Sodium Phosphate-Di.

Sodium Phosphate-Tertiary: See Sodium Phosphate-Tri.

Sodium Phosphate-Tri: $Na_3PO_4 \cdot 12H_2O$. Mol. wt. 380.16. Sp. gr. 1.62. M. P. 77°C. Also known as Tribasic Sodium Phosphate, Trisodium Orthophosphate, Tertiary Sodium Phosphate, T. S. P. Trigonal colorless crystals or granules. Loses water of crystallization at 100°C. Solubility, 28 at 15°C. and infinitely soluble at 100°C. Grades: Technical, Purified, C. P. Containers: Bottles (1, 5 lb.); Cartons and Tins (1, 5, 25 lb.); Boxes (25 lb.); Drums and Bags (100 lb.); Kegs (100, 125 lb.); Barrels (325, 350, 500 lbs.).

Sodium Phosphate-Tribasic: See Sodium Phosphate-Tri.

Sodium Platinocyanide: $Na_2Pt(CN)_4 \cdot 3H_2O$. Mol. wt. 399.41. Colorless, triclinic crystals. Soluble in water. Soluble in alcohol. Grades: Technical. Containers: Bottles (½, 1 oz.).

Abbreviations: Mol. wt. = Molecular Weight; Sp. gr. = Specific Gravity; M. P. = Melting Point; B. P. = Boiling Point; Solubility figures, where given, are parts by weight in 100 parts of water; Technical = Grade usually used for industrial purposes; Purified or Pure = Better grade than Technical; U. S. P. = Conforms to standards of U. S. Pharmacopoeia; C. P. = Chemically pure, exceeding requirements of the U. S. P.; N. F. = Meets requirements of the National Formulary

THIS IS WASHINGTON—

By George W. Grupp
METAL FINISHING's Washington Correspondent

Baltimore-Washington Branch March Meeting The Pine Panel Room of the Caribbean Tea Room of Baltimore was packed to the doors with members and guests of the Baltimore-Washington Branch of the American Electroplaters' Society who turned out for the March meeting, in spite of the little snowstorm, to hear Dr. R. M. Thomas, director of research of the Rheem Manufacturing Company of Baltimore deliver an informative talk on Iridite. "Through the courtesy of Shepherd Warnock," it was officially announced, "Sultan Brenner" came to Baltimore with "his entire harem from the Bureau." During the business session of the meeting Dr. William Blum of Washington and Harry C. Grant of Baltimore were appointed as a committee of two to round up articles for exhibition at the next national convention of the American Electroplaters' Society. During this session Samuel R. Warnock, who has been president of the Branch for three successive terms, announced that he had no desire to run for a fourth term. To this some members replied that they might draft him for a fourth term at the April meeting of the Branch. At the suggestion of Samuel R. Warnock the Branch voted that no one shall be dropped from its membership for non-payment of dues if such person is serving in the armed forces.

Rice Made Chief of Electroplating and Anodizing Equipment Charles A. Rice, who was William McCord's assistant at the War Production Board for about one year, succeeds McCord as Chief, Electroplating and Anodizing Equipment Section of the General Industrial Equipment Division of the WPB. Mr. Rice, a native of Wheeling, West Virginia, was educated in the public and high schools of Los Angeles, California, and spent most of his life on the Pacific Coast. Rice understands plating shop problems from both the practical operating and administrative points of view because of years of experience in his own shop in Vancouver, British Columbia, and from practical experience in laying out plating shops and in designing and supervising the construction of special plating equipment for a number of different firms. Before coming to the WPB, about a year ago, he was president of the Oxoseal Company of Vancouver, B. C., Canada.

Plating Prices Given Thought For the purpose of simplifying pricing for the metal finishing industry discussions are being held in Washington to place all regulations covering metal finishing in General Maximum Price Regulation MPR 136 and MPR 165 under a single regulation. To accomplish this objective two industry price advisory committees are in the process of being selected. One will be known as the "Hot-Dip Galvanizing Industry Advisory Committee," and the other will be designated as the "Plating and Enameling Industry Advisory Committee." W. W. Coutts of the Parts and Subassemblies Section of the Machinery Branch of the OPA, who is trying to unify the regulations, has visited jobbers in different parts of the United States to ascertain the cost practices in the industry.

Size of Plating Industry From authoritative sources it was learned that as of January, 1944, there are in these United States about 1,300 regular jobbers who are engaged in enameling and plating and approximately 100 jobbers are engaged in hot-dip galvanizing. The annual volume of plating and enameling in the United States has been estimated as $100,000,000. The volume of galvanizing of these United States has been estimated to range from $12,000,000 to $15,000,000 per annum.

Financing Reconversion S. Morris Livingston and E. T. Weiler of the Department of Commerce's Bureau of Foreign and Domestic Commerce in discussing the question, "Can Business Finance the Transition?" in the February issue of the *Survey of Current Business*, said: "Existing statistical data are inadequate to analyze this problem in detail by type of industry and size of firm. However, the available information is sufficient to show the picture for business as a whole. From an examination of this material one must conclude that, if the settlement of war contracts is handled with reasonable promptness, business as a whole have the funds to finance the transition and a sizable margin for expansion beyond prewar levels of output."

Aluminum Available for MRO Controlled Materials Plan Regulation No. 5 which governs maintenance, repair and operating supplies of the electroplating, galvanizing and other metal treating and finishing business was amended on February 26, 1944, to make it possible for persons desiring aluminum for MRO purposes to obtain it in the same manner as steel and copper are obtained under CMP. The amended regulation eliminated the limit of 100 pounds of aluminum for MRO purposes. The wording was changed in a number of parts for the sake of clearness.

Aluminum Production Increases in the United States According to the War Production Board, the primary aluminum production in the United States in 1943 amounted to 1,839,800,000 pounds as compared with 1,042,200,000 pounds in 1942. The production of secondary aluminum rose from 370,400,000 pounds in 1942 to 527,600,000 pounds in 1943.

Blanket Construction Authorization Restricted Direction No. 3 of Conservation Order L-41 issued on March 6, 1944, states that blanket authorizations, which were used to permit owners of substantial industrial and commercial establishments to carry on miscellaneous routine construction during a fixed period, will no longer be issued generally. Such blanket authorizations will be only issued in cases where the war effort would be hindered, or in the case where such refusal would be an extreme hardship for the applicant.

Cobalt Discovered in Spain A cobalt ore deposit was recently discovered in the Province of Oviedo, Spain. Plans for exploiting this deposit are under way. According to present plans the deposit will yield about 200 tons of cobalt a month.

Wood and Fibre Container Regulations According to Preference Rating Order P-140 as amended February 29, 1944, and Preference Rating Order P-146 issued on February 29, 1944, wood and fibre shipping containers needed to ship a product may now be purchased with the same rating assigned for producing the product. A person not entitled to use the ratings assigned according to the provisions of the regulation may use an AA-2X rating if his blanket maintenance, repair and operating supplies rating is AA-1. He may use an AA-3 rating if his blanket MRO rating is AA-2, and he may use an AA-5 rating if his blanket MRO rating is AA-3 or lower.

Copper Scrap Paper Work Reduced The War Production Board announced on March 9, 1944, that it is now only necessary to report the generation or accumulation of copper and copper-base alloy scrap when the amount is in excess of 50,000 pounds. Those companies which generate or accumulate less than 50,000 pounds are no longer required to file Form WPB-452 even though they must comply with the provisions of Copper Order M-9 which requires the disposal of all scrap in excess of a 30 days' accumulation unless such accumulation aggregates less than 10,000 pounds.

Nickel Restrictions Eased Nickel anodes, nickel salts and plating solutions in platers' inventories which were frozen January 20, 1942, were made available for all purposes permitted by existing regulations through the issuance on February 10, 1944 of Direction No. 1 to Conservation Order M-6-b. The Direction provides that "notwithstanding the provisions of Conservation Order M-6-b, the solutions may be used by any person holding them on February 9, 1944, who had acquired them on or before March 30, 1942, or by any person who acquires them after February 9, 1944, for any purpose whatsoever, if (1) no nickel anodes (scrap or otherwise) are used in the plating process and (2) no additional nickel salts are added to the solutions. If the nickel anodes are used or salts are added to the solutions the solutions may be used without further authorization from the War Production Board, in any manner not prohibited by paragraph (a) and List A of Order M-6-b, unless of course, specific restrictions were placed on the use of the anodes or salts at the time of their allocation by the War Production Board."

MRO Ratings Are Not All Blanket Ratings Interpretation No. 9 of Priorities Regulation No. 3 issued on January 24, 1944, makes it clear that "when a rating assigned pursuant to Schedule B of P-98-b (as evidenced by the symbol MRO-P-3) is applied to a purchase order for any item which is set out on Schedule B of that order that rating is valid, despite the fact the item is also on List B of Priorities Regulation 3." The interpretation states further that "the order does not require the purchaser to furnish a copy of his approved purchase order to the supplier, and the supplier should give effect to the rating and certification unless he knows or has reason to believe that the purchase order has not been rated as provided in Schedule B of Order P-98-b."

Porcelain Enameled Ware in Smaller Sizes Recommended At the February 8, 1944, meeting of the Porcelain Enameled Utensil Industry Advisory Committee of the WPB were told by the board that the possibility of increasing production of enameled ware for civilian uses will not be settled for some time. The industry was advised to save material by making smaller sizes of those utensils now permitted.

Production and Delivery Schedules The War Production Board announced on January 24, 1944, that in event of conflict between production and delivery schedules under the Controlled Materials Plan and delivery schedules under General Scheduling Order M-292, the delivery sequence called for under the General Scheduling Order shall control.

Lighting Fixture Restrictions Lifted Limitation Order L-212 was amended on March 15, 1944, for the purpose of removing the restrictions on the use of metals in industrial type of incandescent lighting fixtures. The amended order provides that the sale of industrial and utility fixtures is limited to purchase orders bearing preference ratings of AA-5 or better. But despite the relaxation on the use of metal, other WPB orders restricting the use of materials in incandescent lighting fixtures and parts must be complied with such as M-1-i (aluminum), M-9-c (copper) and M-126 (iron and steel).

Metal Finishing Continued on Essential Activities The War Manpower Commission revised its list of essential activities on February 25, 1944. The metal finishing industry was continued on the list. Under metal finishing are included enameling, japanning, lacquering, painting, plating, galvanizing, aluminum coating, polishing, rust-proofing of metal products, sherardizing, retinning of cans and utensils.

Order M-41 Revoked General Preference Order M-41 which governed chlorinated hydrocarbon solvents was revoked by the War Production Board on March 3, 1944.

Priorities Regulation No. 3 Amended Priorities Regulation No. 3 as amended February 26, 1944, provides that "Blanket MRO ratings, as defined in paragraph (e) (2), may not be used to obtain" such items as "Galvanized ware and non-metal coated metal articles as governed by Limitation L-30-a," and "light power driven tools (as defined in L-287) which had a producer's list price on October 15, 1942 of more than $175 such as abrasive belt finishing machines."

Renegotiation Reserves Joseph M. Dodge, chairman of the Joint Price Adjustment Board, recently announced that renegotiation reserves which war contractors set up and show in their statements are not to be regarded by renegotiation officials as binding on contractors. It is the opinion of Chairman Dodge that the increasing practice of providing such reserve should be encouraged.

Restrictions on Flat Iron Production Eased Supplementary Limitation Order L-65-a issued on February 24, 1944, provides for the production of 2,000,000 flat irons for civilians and 76,000 flat irons for Army, Maritime Commission, Lend-Lease, Navy and Foreign Economic Administration during the year 1944. Manufacturers who wish to make electric irons should apply for permission on Form WPB-3550.1. Production will be limited to plants where labor is available.

Service Equipment Production to be Increased Service Equipment Order L-54-c was amended on February 26, 1944, for the purpose of granting permission to produce a limited quantity of autographic registers, change-making machines, and shorthand

writing machines, check-handling machines, envelope-handling machines, postal permit mailing machines, stamp canceling machines, and currency counting machines.

How to Organize Labor-Management Committees The WPB War Production Drive Headquarters, Municipal Building. Washington, D. C., has issued a report on "How to Organize and Operate a Labor-Management Production Committee" which may be had for the asking. This report deals with such topics as (1) planning the size of the committee, (2) choosing the members, (3) selecting officers, (4) voting in committee, (5) the minutes of the meetings, (6) committee programs, (7) committees and their functions.

Copper Restrictions Liberalized Amendment No. 2 to Conservation Order M-9-c as amended on March 10, 1944, provides that sew-on, machine attached or riveted snap fasteners, buckles, eyelets, staples, rivets and burrs may be manufactured from copper if they are for military use and if they are purchased on orders bearing AA-3 preference ratings or higher.

Corundum Substitutes Being Sought At the meeting of the Corundum Industry Advisory Committee of the WPB held in Washington on February 23, 1944, it was revealed the current imports of corundum are still insufficient to meet the domestic demand for this material. To relieve this condition ways and means were discussed to produce corundum from old workings in Montana. Substitutes for corundum superfine flours are being sought.

Corundum in Small Orders Exempted The War Production Board amended Conservation Order M-89 on March 10, 1944, to exempt from allocation restrictions small order users of corundum. The amended order exempts deliveries up to 25 pounds per month of finely ground corundum (known as superfine flours) of all sizes provided the consumer does not have an inventory in excess of his average 60 day consumption.

Laboratory Supply Restrictions Eased Conditions under which priority assistance is given to laboratories were clarified on by the issuance of Preference Rating Order P-43 as amended March 6, 1944. The amended order provides that laboratories that have been assigned serial numbers by WPB may not use their AA-1 preference rating for activities connected with future civilian markets. Restrictions on the quantity of aluminum needed for laboratory purposes have been removed by the amended order. Hand tools and safety equipment bought by a laboratory for resale to its employees for use in the laboratory's activities may be obtained under the order.

Labor-Management Exposition The first national Labor-Management Exposition, which was held from March 3 through March 11 in the Department of Commerce Auditorium, Washington, D. C., was a huge success. Movies, dioramas, models and gadgets of 65 different companies representing the work of Labor-Management Committee in about 200 different plants thrilled the crowds which came to see the exposition. Among the exhibitors were such firms as Allis-Chalmers Manufacturing Company, Aluminum Company of America, American Smelting and Refining Company, Anaconda Copper Mining Company, Bell Aircraft Corporation, Bridgeport Brass Company, International Business Machines Company, Pratt & Whitney, Inc., United States Cartridge Company, Western Electric Company, and Westinghouse Electric & Manufacturing Company. Westinghouse had an exposition of chromium plating, showing how this method of plating enhance the life of tools and parts.

Silver Situation Discussed At the March 16, 1944, meeting of the Silver Producers and Distributors Industry Advisory Committee of the WPB it was revealed that during 1943 the domestic consumption of silver amounted to 118,000,000 ounces and that the total domestic production amounted to 40,000,000 ounces. About 71,000,000 ounces consumed was absorbed by essential industries. The Committee discussed the advisability of amending Order M-199 to correct some reported abuses of the present order.

Small Electric Motor Situation At the March 9, 1944, meeting of the Fractional Horsepower Motor Industry Advisory Committee it was brought out that "while the production of standard alternating current motors for use in civilian products is increasing, yet the supply available for products just coming on the market is decreasing since presently programed production for aircraft and essential civilian requirements utilize more and more of the existing production facilities."

"Special Sales" of Idle Materials The rules governing "special sales" of idle and excess materials as covered by Priorities Regulation No. 13 were broadened to include finished products as well as industrial materials. To include this coverage the regulation was amended on February 29, 1944. This regulation covers metals and metallic ores, chemicals, paints and varnishes, abrasives, rubber products, motors and generators and other equipment.

Tetrachlorate Under New Order On March 3, 1944, the War Production Board announced that carbon tetrachlorate, trichlorethylene and perchlorethylene have been placed under allocation orders M-371 and M-363.

Tinplate Production During 1944 Second Quarter According to an estimate issued by the War Production Board on March 2, 1944, the tinplate production for the second quarter of 1944 will be 825,000 tons.

Zinc Restrictions Eased Limitation Order L-68 as amended March 2, 1944, authorizes the use of zinc in the manufacture of button backs, tack capping shells of buttons used on coated fabric garments, and *as a protective coating on all closure items.*

Zinc Plating Permitted Permission was granted to use zinc as a protective coating of, or for the plating of, binder metal parts such as blank books, loose leaf books and covers. This usage was given in Limitation Order L-188 as amended March 16, 1944. The amended order provides that no metal other than iron, steel, or zinc may be used in fabricating metal parts, or units, of binders. Zinc may be used only for protective coating and plating the metal parts of binders.

Zinc Usage Broadened Conservation Order M-11-b was amended on March 9, 1944, to permit the use of zinc in the manufacture of many finished products hitherto restricted. For example, the amended order permits the "applying a protective coating or plating of zinc on loose leaf metal parts and units. (See General Limitation Order L-188.)" It is now permitted to use zinc for coal stockers, domestic electric ranges, mechanical pencils, dry cell batteries and portable electric lights, and for motorized fire apparatus.

SHOP PROBLEMS

PLATING AND FINISHING
POLISHING — BUFFING
CLEANING — PICKLING
HOT DIP FINISHES

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Bibliography

Question: Mr. G. B. Hogaboom, Sr.'s bibliography, "An Electroplating Library—Revised and Amplified" which appeared in the January, 1944, issue of *Metal Finishing*, lists a book by M. Kolodney, "Chromium Plating, Bibliography and Correlated Abstract of the Published Literature."

We would like to obtain the book and would appreciate if you could advise us as to who publishes the book or where we can obtain a copy of it.

M. & T. CORP.

Answer: The War Metallurgy Committee which issued this bibliography does not have any more copies available.

However, microfilm copies may be obtained at 75c, or large readable photoprints at $7.50 may be obtained from the American Documentation Institute, 1719 N. Street, N.W., Washington, D. C.

This bibliography should be ordered as Document 1806.

Etching Ink

Question: We are interested in obtaining information on a satisfactory solution that can be used to etch hard chromium plate when stamped with a rubber stamp such as is used for inspection approvals.

R.R.B.CO.

Answer: We would suggest that you try a mixture of equal parts of concentrated hydrochloric acid and glycerine as an ink for this purpose.

If possible, the chromium plated articles should be warm when the ink is applied.

Electrolytic Polishing

Question: Please forward to us any information or source of information you may have in regard to electro burnishing of stainless steel.

A. CO.

Answer: Two fairly complete resumes on electrolytic polishing of stainless steel appeared in *Metal Finishing*.

The references are as follows:

1. S. Tour—*Metal Industry*, **38**, 308-12 (1940) covers processes to that date.

2. Young & Brytczuk—*Metal Finishing*, **40**, 237-41, 306-12 (1942) also covers processes to date.

Later details will be found in our patent abstract section which appears as a monthly feature in *Metal Finishing*.

Plating on Plaster

Question: We are interested in "Electroplating of Plaster with Metal Deposits."

Could you advise us regarding literature which is suitable, to the point, and practical?

I. CO. LTD.

Answer: A section on this subject appears in the 1942 edition of the *Plating and Finishing Guidebook*, pp. 101-4. Copies of this handbook, if you do not have any, are available at $1.00 each.

Substitutes

Question: We are interested in getting the latest data on substitutes for nickel, cadmium and chromium plating in connection with our display clocks which must resist corrosion and also present an attractive appearance. Any assistance you can give us will be appreciated.

S. W. P. CORP.

Answer: Polished zinc or silver may be considered for this application, preferably followed by a lacquer coat to preserve the finish.

Zinc Plating

Question: We are zinc plating small steel stampings 0.0005", taking them from the bath, rinsing in warm (160°F.) water to wash off cyanide and immersing in a Cronak bath from 10-14 seconds; consisting of 26.6 oz. bichromate and 1.2 fluid oz. Sulphuric Acid to each gallon of water, maintained at approximately 0.9°Bé. and operated at room temperature.

What has happened lately has been that with all the above conditions maintained we get batches (on rack plating) from which the Cronak finish rubs off, after the work lays finished for a short time.

R. C. L.

Answer: We suggest that you try a cold rinse followed by the Cronak dip and followed again by a cold rinse. The hot rinse should be eliminated as the Cronak finish is heat sensitive and will not be adherent if a hot rinse is used. Blow the water off with compressed air. Reduction of the acid concentration to 1 fluid oz. per gallon may also be of help.

Polishing Small Parts

Question: I have a small tumbling barrel 15" inside diameter by 7" width, octagon shape, and wood lined. The speed is 37 R.P.M. I want to use it for polishing small parts, both stampings and castings, of non-ferrous metals. These parts will range from approximately ¾" diameter up to approximately 1½" for the stampings. The castings may run as large as 1" diameter by 3" or 4" in length. Will you please give me a formula for cutting down and polishing this material.

We have available tripoli powders in various grades for this work, if they would be the proper thing to use.

W. B. G.

Answer: A standard procedure for brass is to roll for 10-15 hours in a 1-5% sulphuric acid solution and sand in order to remove scale and burrs. This is followed by rolling for about 10-40 hours with from 1-2 pounds of rottenstone or tripoli and water to 50 pounds of work.

The articles are then bright dipped to remove the dark film and ball-burnished to obtain the desired brightness, which will take possibly 2-3 hours.

Another process for cutting down after the sand roll is as follows:

20 pounds of sawdust are placed in a barrel, and while rotating, 4 pounds of melted tallow are poured in. After a short period 4 pounds of double ground tripoli and 1 pound of precipitated chalk are added and the rolling continued for a short while to coat the sawdust. The work is rolled in this mixture until the required finish is obtained.

Properly compounded finishing compounds can be obtained ready for use from companies advertising in *Metal Finishing*.

Your barrel is too small to get any production on the type of work you mention, and in addition, the same barrel is not advisable for the different operations. For large quantities it will be necessary to get a number of barrels.

Hot Tinning Flux

Question: Kindly advise us the formula for the correct flux to be used in hot dip tinning.

H. R. & P. CO.

Answer: Common fluxes consist of 30% solutions of either zinc chloride or zinc ammonium chloride. The salts may also be used as a cover coat for the rough tin bath.

Special fluxes are available from supply houses.

Patents

Wire Plating Machine

U. S. Pat. 2,388,795. L. G. Berquist, assignor to National Standard Co., Jan. 11, 1944. In wire plating apparatus of the type including a tank adapted to contain a plating solution and means for guiding a wire substantially horizontally through said tank below the level of the solution, the combination of an electrical contactor carried by the tank and engaging the wire, comprising an angular body of non-corrosive non-conducting material including an upper arm and a downwardly extending vertical arm, said body being pivotally supported at the upper end adjacent the outer end of the upper arm and formed at the lower end of its vertical arm with a groove to straddle the wire and having a passage extending through said other arm and opening into said groove, and a metallic rod connected at the upper end to a source of electric power and extending loosely through said passage and terminating adjacent the surface of the groove to contact the wire, the point of contact of the rod and wire being vertically offset from the pivotal mounting of the upper arm, and the end of the metallic rod being held against the wire by the weight of the rod and of said body acting about the pivotal mounting of the member.

Vitreous Enamel

U. S. Pat. 2,304,884. C. J. Kinzie and H. Commons, Jr., assignors to The Titanium Alloy Mfg. Co., Feb. 8, 1944. The method of making white vitreous enamel ware with coatings less in weight than 40 grams per square foot and having a reflectance above 70 and substantially greater than that producible with the frit used and fired alone, which comprises milling a mixture of a white frit 100 parts by weight having a basic reflectance above 60, clay, water and not less than 10 parts by weight of an opacifier comprising a calcination product containing an oxide of a base forming metal, antimony pentoxide, and an oxide from the group consisting of titanium and zirconium, said mixture being ground to a fineness where more than 95% by weight of the particles thereof are less than 44 microns in size to form the enamel slip, applying the said slip to ground coated ware as a thin film not exceeding 40 grams per square foot when fired, and burning the slip-coated ware at firing temperatures to produce said adherent vitreous enamel ware.

Metal Spray Gun

U. S. Pat. 2,340,903. A. P. Shepard, assignor to Metallizing Engineering Co., Inc., Feb. 8, 1944. In the nozzle construction of a wire feeding metal spray gun of the gas blast type, including a burner tip provided with a wire feeding orifice, a multiple number of burner jets substantially surrounding the axis of said orifice and means to supply combustible gas through said jets, the improvement comprising an air cap having a first inner surface portion immediately surrounding said burner tip, defining therewith at least one gas blast passage, starting at a point prior to said orifice and having only one other second inner surface portion extending said gas blast passage to in advance of said orifice, and directing gas blast, issuing from said gas blast passage, against the molten tip of the wire feeding through said orifice, the average angle of slope, with respect to said axis of said second inner surface portion being greater than the average angle of slope, with respect to said axis, of said first inner surface portion.

Strip Plating Machine

U. S. Pat. 2,341,157. J. S. Nachtman, Feb. 8. 1944. In apparatus for electroplating metal strip material including a tank having an electroplating bath therein in which bath the strip is to be electroplated, roll means for directing the strip through said bath including a plurality of pairs of upper rolls between which the strip is adapted to move, a roll submerged in the electroplating bath for each pair of upper rolls for guiding the strip from one pair of upper rolls to the next pair of upper rolls, means for propelling the strip through the electroplating bath, one of the rolls of each pair being a contact roll for conducting electroplating current to the strip, the other roll of each pair being a non-conductor carrying roll around which the strip wraps in passing to and from the submerged rolls, each contact roll being smaller in diameter than its associated carrying roll, and adjustable means for each pair of upper rolls resiliently pressing the contact roll of said pair toward its associated carrying roll for gripping the strip between surface portions of the contact and carrying rolls and for effecting intimate surface contact between each contact roll and the strip; whereby electrical contact is provided between the contact rolls and the strip by the contact roll pressure against the strip independently of strip tension, whereby the strip may be propelled under very low tension without slippage between the strip and roll means, and whereby the electroplating current is efficiently and uniformly conducted to the strip without high strip tension and without any material deposition of plating metal on the contact rolls.

Guide Roll for Strip Plating

U. S. Pat, 2,341,158. J. S. Nachtman, Feb. 8, 1944. In a combined squeegee and guide roll assembly for propelling strip material through an electrotreating tank, a support, a pair of parallel rolls mounted for rotation on said support, means mounting said support for rocking movement, power means for actuating said support, finger means mounted adjacent the path of travel of the strip material and adapted to be contacted by a side edge thereof for causing said power means to actuate said support in one direction, and a second finger means cooperating with the other side edge of the strip material for effecting opposite movement of said support, and mechanism actuated in accordance with movement of said support for causing said power means to bring said support to rest after the latter has been moved a predetermined distance by said power means in response to actuation by either of said fingers.

Corrosion Prevention

U. S. Pat. 2,341,513. M. R. Gilbert, Feb. 15, 1944. A coating process for protecting articles constructed of metals of the group consisting of the ferrous metals and alloys thereof; nickel, silver, aluminum, copper, tin, chromium, and the alloys thereof; and which consists in applying to the surface of the article to be coated a layer of coating material of the group consisting of raw beef suet and the glycerol esters of oleic, linoleic or palmitic acid; and then heating the article to a temperature exceeding the melting point of said ester and maintaining said temperature for a time exceeding five minutes.

Vacuum Metallizing

U. S. Pat. 2,341,603. W. Dorn and E. Munk (Germany), vested in the Alien Property Custodian, Feb. 15, 1944. A device for treating objects in vacuo comprising a cylinder, at least two pistons situated therein and cooperating with said cylinder to form between their adjacent ends a chamber whose volume can be changed by the relative movement toward each other of said pistons and whose position within the cylinder can be varied by the common movement of said pistons, said chamber receiving an article to be treated, means to support said article in predetermined position on one of said movable pistons at least one opening being provided in the cylinder wall for introducing the objects to be treated into and removing them from the chamber between the pistons, means including pipe connections opening into the cylinder wall at points spaced from said object-introducing opening and connected with various pressure stages of vacuum producing means to create a vacuum in said cylinder at points spaced longitudinally from said object-introducing opening, and means for metallizing the objects within said chamber between the pistons after this chamber has obtained the volume necessary for the vacuum treatment and a position wherein it is joined with the pipe connection of the highest vacuum stage.

Plating Machine

U. S. Pat. 2,341,606, V. Finston, assignor to The Meaker Co., Feb. 15, 1944. A conveying machine for transporting work between a series of operating stations separated by barriers for electro-processing the same, comprising a plurality of work carrier arms extending horizontally over the operating stations, means for supporting said work carrier arms on a horizontal stationary trackway, means associated with said trackway for moving said arms therealong in a horizontal path, and means including a lower pivotal trackway for swinging said work carrier arms means on said stationary trackway as the same is moved therealong for agitating the work piece during treatment, said carrier arm means being swung and moved along said trackway by a common prime mover.

Cyclone Dust Separator

U. S. Pat. 2,341,671. A. J. ter Linden (Netherlands), vested in the Alien Property Custodian, Feb. 15, 1944. A cyclone dust separator comprising a head having a raw gas tangential inlet, a conduit located axially of said head serving as an outlet for the cleaned gas, a cone having a converging body connected to said head, said cone having a dust outlet and the axis of said cone being curved throughout a substantial portion thereof.

Color Comparator

U. S. Pat. 2,341,810. G. D. Peet, assignor to Wallace & Tiernan Products, Inc., Feb. 15, 1944. In a portable color comparator for colorimetric inspection of liquid material, which includes a pair of adjacent open-ended chambers each adapted to receive and removably retain a transparent container for liquid to be inspected, window means at one side of said chambers for admitting light through the same, and viewing means on the opposite side of said chambers, the combination of enclosed means for illuminating said window means, including an electric lamp and electric cell means for energizing said lamp, switch means for connecting said cell means with said lamp at desired times, and shiftable light-excluding cover means adapted to be moved to enclose said open-ended chambers for preventing escape of light therefrom and shiftable out of said position for access to said chambers.

Filter System

U. S. Pat. 2,342,035. E. R. Clark, assignor to United States Hoffman Machinery Corp., Feb. 15, 1944. A filtering system comprising a receptable having a plurality of chambers one of which constitutes a storage reservoir for filtrate, means for delivering filtrate from said reservoir to a place of use at a uniform rate, a second chamber containing one or more screens adapted to support filter aid thereon, a discharge header communicating with said screens, an inlet passageway receiving liquid from the place of use and having ports through which the liquid may flow into said screen chamber, means for conveying filtrate from said header to said storage reservoir, a second passageway communicating with said reservvoir and said inlet passageway whereby filtrate in excess of that discharged to the place of use is returned to the said screen chamber, said second passageway being sufficiently open and unobstructed to permit accumulated liquid to flow back into the reservoir if the flow of such liquid through said screen is prevented.

Filter Cloths

U. S. Pat. 2,342,230. K. Weber and G. Bode (Germany), vested in the Alien Property Custodian, Feb. 22, 1944. Filter cloths for electrochemical diaphragms which are tight in the presence of strongly acid electrolytes of an oxidizing action consisting of shrunk felted fibers of after-chlorinated poly-vinyl chloride impregnated with silicic acid and at least one water-insoluble salt of a metal of the group consisting of calcium and barium.

Sheet Plating Machine

U. S. Pat. 2,342,688. H. J. Paynter, assignor to American Can Co., Feb. 29, 1944. In an apparatus for cathodizing and anodizing the surface of sheet material, the combination of a rotatable wheel holder for the sheet to be treated, said holder having a plurality of peripheral chambers for receiving a liquid electrolyte, each of said chambers having a radially disposed conduit for conducting the electrolyte to said chamber, means for clamping the sheet on the periphery of said holder within a said chamber as a part of an electrical treating circuit including said holder and exposing predetermined surface areas only of the sheet which are to be treated, means for radially projecting said electrolyte under pressure through said conduits into said chambers into contact with said exposed sheet areas, and means for passing an electric treating current through said electrolyte, first in one direction and then in the other to both cathodize and anodize the treated areas of the sheet.

Corrosion Prevention

U. S. Pat. 2,342,738. G. W. Jernstedt, assignor to Westinghouse Electric & Mfg. Co., Feb. 29, 1944. The method of treating the surface of zinc and ferrous metals to provide for corrosion resistance which comprises, in combination, applying to the member a di-alkali metal phosphate solution containing 0.001% to 0.01% of ferric iron based on the amount of the di-alkali metal phosphate to provide an activating pretreatment and thereafter applying to the pretreated member a solution comprising iron phosphate, free phosphoric acid and an oxidizing agent to produce a crystalline corrosion resisting phosphate coating thereon.

SYSTEMATIC IDENTIFICATION OF THE COMMON METALLIC COATINGS

(*Concluded from page* 210)

a. Green solution is formed: Chromium.

b. No action apparent: Rhodium and platinum metals.

B. Plating is attacked by nitric acid, giving a green solution. Place hydrochloric acid on new spot, take up on filter paper, render ammoniacal, and add dimethylglyoxime.

1. Red coloration formed on paper: Nickel.
2. No red color obtained: Chromium.

C. Plating is attacked by nitric acid, giving a colorless solution. Perform cacotheline test. Place small amount of solid cacotheline on a small filter paper and add one drop of water. Place one drop of hydrochloric acid on the metal and touch the reverse side of the paper holding the cacotheline to the spot of acid. A red-violet color is a positive reaction.

1. Reaction is positive: Tin.
2. Reaction is not positive. Place nitric acid on a new spot, take up on filter paper, render ammoniacal, and add sodium sulfide.

a. Spot remains colorless or white: Zinc.

b. Spot becomes bright yellow: Cadmium.

c. Spot becomes brown-black. Place nitric acid on a new spot, take up on filter paper and add sodium hydroxide.

1. Spot becomes brown-black: Silver.
2. Spot remains colorless or white: Lead.

Summary

A systematic procedure is described for the identification of metals used in the plating of various metallic and non-metallic articles. The authors have used this method extensively and have found it to be dependable and accurate. Precautions must be carefully heeded to achieve the best results. Very small quantities of reagent and metal surface are used in the identification. A complete test may be run in less than 5 minutes.

930 SPOTS

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SPOT WELDING TEST

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Here's one "help wanted" problem that's easily solved . . . even in these days of man-power shortages. If it's a problem in metal cleaning and working . . . the Diversey D-Man is always on deck to lend a helping hand. Backed by a Research Laboratory that has spent 18 years developing special purpose products, the Diversey D-Man can often show you ways to step-up production that require less manpower.

In a recent independent production test with 13 other processes, aluminum treated by the Diversey Process averaged 930 spots before tip fouling. All shear test requirements were easily met. Results . . . checked and rechecked by technicians in the plant conducting the test . . . definitely established the excellence of the Diversey Process.

The Diversey Process involves two simple steps:

1. Removing all foreign matter from the surface with Diversey Aluminum Cleaner, a dry, white powder, easily used in still tank cleaning, whose powerful cleaning action is inhibited to prevent pitting, staining or discolorations.
2. Eliminating the oxide film with Diversey DC No. 1, a non-toxic, non-fuming powder developed to replace harsh, corrosive, dangerous acids.

It has been definitely established that the production of consistently sound spot welds is, in part, a function of the surface treatment. The presence of oxide film and its attendant high electrical resistance cause irregularities that affect the uniformity and quality of the welds. Aluminum test strips treated by the Diversey Process show no "water breaks," indicating a chemically clean surface . . . while surface resistance averages as low as 12 microhms.

Today the Diversey Process is in use in many large aircraft and other plants throughout the country . . . consistently giving quality spot welds with greatly increased tip life. For further details send for free technical bulletin No. 501. Address Metal Industries Dept. W4,

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NEW EQUIPMENT AND SUPPLIES

NEW PROCESSES, MATERIALS AND EQUIPMENT FOR THE METAL INDUSTRY

Portable Tank

A new type of portable heating and dipping tank, including an acid compartment and differing from ordinary dipping tanks in a number of basic respects, has been developed by the Heil Engineering Company, Dept. MF, 12901 Elmwood Avenue, Cleveland, Ohio.

Known as a "utility tank" and designed for a wide variety of uses, the tank is divided into three compartments which are basically designed for degreasing, rinsing and pickling. However, it is also perfectly suited for etching, plating, metal coloring, waxing, fluxing, oiling, lacquering, dip painting, rust removing, macro and salt spray testing, anodizing, pilot and laboratory operations, and photo finishing. Because of its unusual flexibility and portability, it is suitable for any manufacturing plant, machine shop, garage, public utility or laboratory.

A highly unusual feature is a dual purpose cover and shelf, which is thoroughly acid proofed and arranged to drain into the tank.

To operate the tank, it is necessary only to fill the compartments and plug the flexible extension cord into any 110- or 220-volt circuit. Compartment No. 1 is furnished with a standard heating unit for hot alkaline degreasing compounds, compartment No. 2 is for cold rinsing, and compartment No. 3 is lined with Plast-O-Ply, an acid resistant coating suitable for pickling acids such as sulphuric, muriatic, phosphoric, hydrofluoric and oxalic, in dilute solutions. This lining is also satisfactory for most electroplating chemicals, including alkali, acid or salt compounds; for acid cleaners used on aluminum and magnesium; and for corrosive fluxing salts.

Heating units can be supplied extra for all three compartments if required. An insulating wall between compartments 1 and 2 prevents heat loss from compartment 1 when compartment 2 is used without heat. All compartments are equipped with bottom and overflow outlets. Heating units are equipped with automatic temperature control.

The tank is integral with a welded steel frame, equipped with swivel casters. Overall size of standard models is 20″ x 56″ x 36″ high, although special sizes of the same equipment are available. In standard models, compartments are made to accommodate 12″ round or square baskets. Any model, standard or special, can be moved anywhere with ease. Special linings, including steel, lead and Koroseal, the latter for use with nitric and chromic acid solutions and other oxidizing chemicals, are also supplied on request, as are many other extras, including indicating thermometers, acid-proof electric heating elements, gas fired heaters, dipping baskets, etc.

Solvent Emulsion Cleaner

Pennsalt EC #10, solvent emulsion cleaner developed by Pennsylvania Salt Manufacturing Company combines soap emulsifying action with solvent penetration. Composed of emulsifying agents and suitable solvents it is of the self-emulsifying, non-phenolic type. Suggested uses are for removing grease, oil, smut, and drawing and buffing compositions from metals and painted surfaces. Undiluted material may be applied cold by dipping, spraying, or brushing. It is also applicable to power washer cleaning in water emulsion form. Packed in 55 gallon drums it is available in commercial quantities from Special Chemicals Division of Pennsylvania Salt Manufacturing Co., Dept. MF, Philadelphia, Penna.

Professional Directory

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Platers Technical Service Co.
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Complete services, including solution analyses, process development and deposit tests.
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PUT *Beckman* pH CONTROL TO WORK IN *YOUR* PLANT

1. INCREASING PLATING SPEEDS
2. REDUCING COSTLY "REJECTS"
3. PRODUCING SMOOTHER COATINGS
4. IMPROVING PLATING EFFICIENCIES

By Beckman-controlling the pH of your plating processes you can make FOUR important savings in your plant operations . . . *vital* savings that mean higher quality platings at substantially lower operating costs . . .

1. By closely controlling the pH of your plating baths you can generally operate at higher current densities without risk of faulty coatings. This means faster plating, reduced costs. *And remember—Beckman is the only pH equipment that will accurately control alkaline plating operations such as cadmium, zinc, brass, etc.!*

2. The controlled-coatings produced by Beckman-regulated plating baths minimize blistering, peeling and off-color deposits, thus greatly reducing "rejects" and costly waste of time and materials.

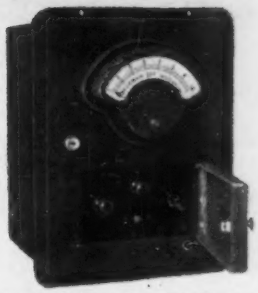
3. Not only are blistering and peeling practically eliminated, but Beckman-controlled coatings are far more uniform and smoother, insuring highest quality platings on run after run.

4. And because Beckman-controlled plating processes are simple to handle and uniformly effective at all times, even inexperienced plant workers can turn out consistently top-quality plating jobs with minimum loss. Over-all plant efficiencies are greatly increased!

LET US HELP YOU take full advantage of the multiple savings possible through Beckman pH Control. Our engineering staff will gladly make recommendations to fit your particular requirements.

NATIONAL TECHNICAL LABORATORIES
SOUTH PASADENA • CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF GLASS ELECTRODE pH EQUIPMENT



The Beckman Automatic pH indicator is the most advanced pH instrument available today. Incorporates many unique features found in no other make or type of equipment. Operates standard control and recording equipment. Ask for Bulletin 16!

The Beckman Industrial pH Meter is ideal for portable plant and field use. Simple, quick, accurate. May be used with Beckman Flow Type and Immersion Type Electrode Assemblies for maintaining pH check on solutions in process. Ask for Bulletin 21!

SEND FOR YOUR COPY OF THESE HELPFUL BECKMAN BOOKLETS!

"What Every Executive Should Know About pH"—a simple, non-technical discussion of what pH is, how it's used, and its importance to modern industrial operations.

Bulletin 86—The most complete catalog available on modern pH equipment. Lists and describes over 60 different electrodes together with accessory equipment for all types of applications.

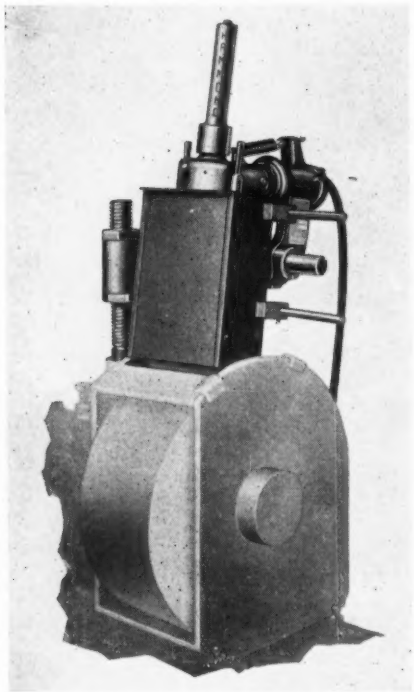
Beckman THE LEADING NAME IN pH

Composition Applicator

A new automatic air-operated cylindrical and rectangular composition applicator for use on any type of polishing and buffing machine has just been announced by Hammond Machinery Builders, Inc., Dept. MF, 1601 Douglas Ave., Kalamazoo, Michigan.

This new composition applicator known as the Hammond Auto-Doper is so simply designed and constructed that it can be used for either cylindrical or rectangular bars, it is claimed, by merely changing the composition housing for the type of bar required. The Hammond Auto-Doper is operated by compressed air and the frequency of operation is controlled by an air valve operated from a cam, electrical timer or foot valve as the requirement may indicate.

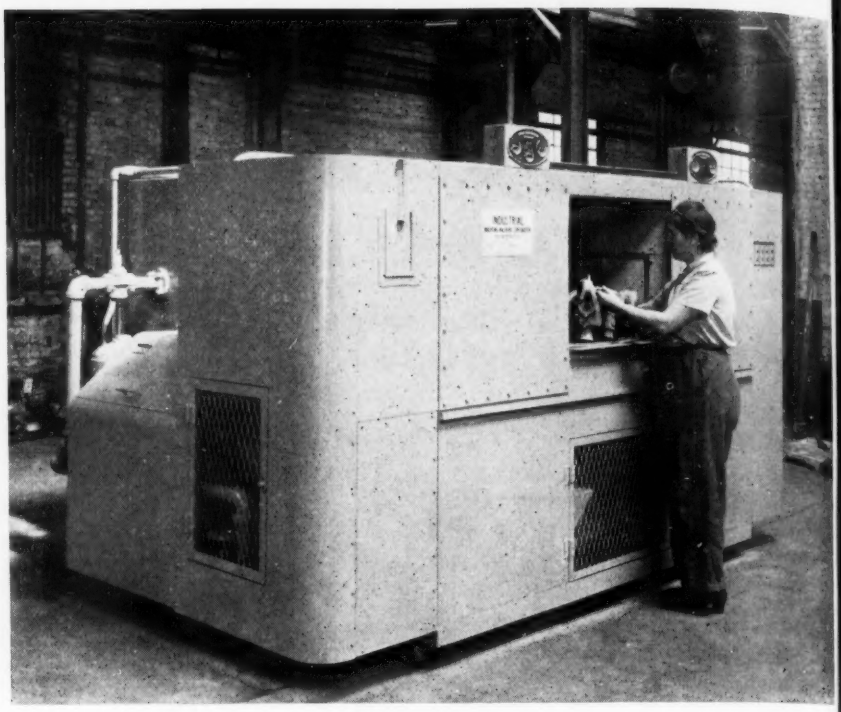
Further claims made are: more uniform application of composition thus improving quality of work and economy in composition costs. It is also said that, because of the simplicity of construction and operation by compressed air, only one moving part is required. Air operation does not require special gear motors or solenoids—thus electrical characteristics are not a problem in plants using the air operated Hammond Auto-Dopers, it is claimed, because the simplicity



of air-operating construction with easy adjustment of adjusting screw permits rapid change of frequency of application when desired.

Hammond Cylindrical Auto-Doper (Type ADC) is for cylindrical composition bars up to 2¾ inches in diameter and 10 inches long. The composition bar is partially rotated at each stroke which permits using up the full diameter of the bar regardless of the width of wheel.

Hammond Rectangular Auto-Doper is for composition bars 2 x 2 inches and up to 2 x 12 inches wide and 10 inches long, for applying composition to wheels from 2 to 12 inches in width. Bulletin and prices will be sent upon request.



Washing Machine

The machine pictured here, manufactured by Industrial Washing Machine Corporation, Dept. MF, New Brunswick, New Jersey, is known as the Segmented Cabinet washing machine.

The machine consists of a large mesh turntable (or special fixtures depending upon the nature of the work to be cleaned), which rotates slowly. Surrounding the turntable is the housing which is portioned off into various combinations of washing, rinsing (or slushing) and drying.

The parts to be cleaned are placed either directly upon the mesh or on the fixtures. As the turntable rotates it carries the work through the above mentioned cleaning operations and returns it to the same operator who does the loading.

Production ranges from 2 to 10 square fe of work per minute.

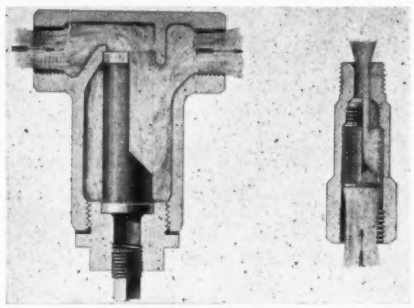
Advantages of this new type machine ov many conventional types are:

1. Only one operator needed.
2. Small floor space occupied (11' x 7'
3. Superior spray coverage.
4. Experienced operator not needed.
5. Any of the cleaning detergents now o the market can be used in this machine

Machines of this type are now in us cleaning cylinders, gears, piston rings, con necting rods, master rods, pistons, machine castings, die castings, rocker arms and flexi ble metal conduit. Write for full particulars

Spraying Systems Strainers

Improvements in both design and construction are featured in two types of liquid strainers developed by Spraying Systems Co.



For installations involving the use of several nozzles on a single feed line, the type TW offers unique advantages. Design of the strainer results in an extremely large open screen area in relation to the pipe area of the line, so that it may easily handle the full capacity of a line supplying several nozzles. Consequently, the TW permits free flow of the liquid and does not require cleaning as often as ordinary strainers. A blowout plug makes the TW easy to flush and clean without removal from the line.

The standard type TW is supplied with cast iron body and brass wire screen; all brass or all stainless steel construction is also available.

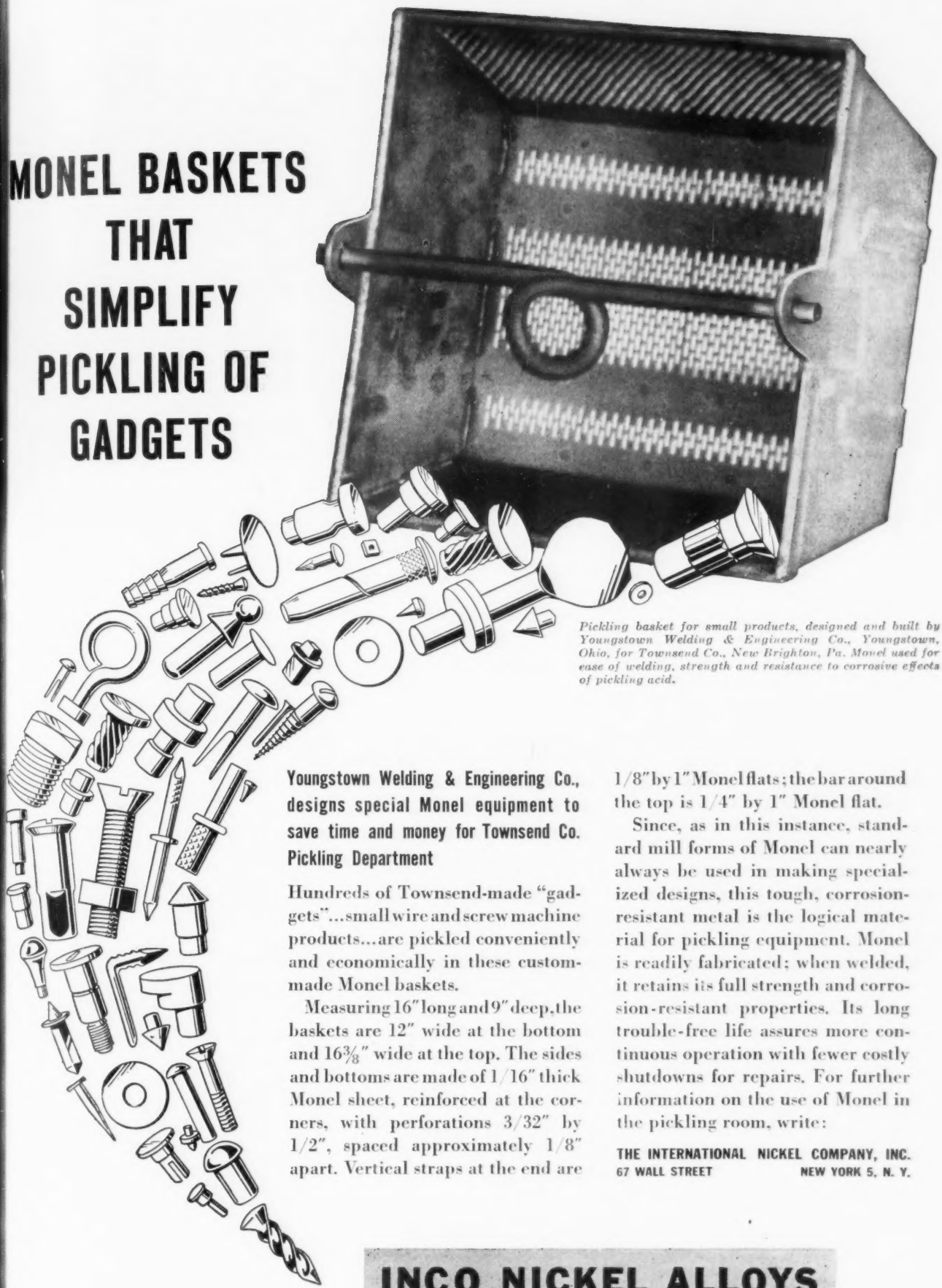
A choice of screen mesh is offered so that performance of the strainer may be directly related to size of nozzle orifice.

In the type Q line strainer, a highly effective strainer for single nozzle installations is offered. Maximum capacity of this strainer is one gallon per minute of water, brine, oil and liquids of similar viscosity.

The screen in this strainer is removable to facilitate cleaning, and like the TW, the type Q is available in several materials.

Complete information and specifications on these strainers may be obtained from the manufacturer, Spraying Systems Company, Dept. MF, 4039 West Lake Street, Chicago 24, Illinois.

MONEL BASKETS THAT SIMPLIFY PICKLING OF GADGETS



Pickling basket for small products, designed and built by Youngstown Welding & Engineering Co., Youngstown, Ohio, for Townsend Co., New Brighton, Pa. Monel used for ease of welding, strength and resistance to corrosive effects of pickling acid.

Youngstown Welding & Engineering Co., designs special Monel equipment to save time and money for Townsend Co. Pickling Department

Hundreds of Townsend-made "gadgets"...small wire and screw machine products...are pickled conveniently and economically in these custom-made Monel baskets.

Measuring 16" long and 9" deep, the baskets are 12" wide at the bottom and 16 3/8" wide at the top. The sides and bottoms are made of 1/16" thick Monel sheet, reinforced at the corners, with perforations 3/32" by 1/2", spaced approximately 1/8" apart. Vertical straps at the end are 1/8" by 1" Monel flats; the bar around the top is 1/4" by 1" Monel flat.

Since, as in this instance, standard mill forms of Monel can nearly always be used in making specialized designs, this tough, corrosion-resistant metal is the logical material for pickling equipment. Monel is readily fabricated; when welded, it retains its full strength and corrosion-resistant properties. Its long trouble-free life assures more continuous operation with fewer costly shutdowns for repairs. For further information on the use of Monel in the pickling room, write:

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK 5, N. Y.

INCO NICKEL ALLOYS

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • "Z" NICKEL • NICKEL

Sheet... Strip... Rod... Tubing... Wire... Castings

M. S. A. Colored Filters

A new development in respiratory safety by Mine Safety Appliances Company is their M. S. A. Colored Filters for M. S. A. Comfo and Dustfoe Respirators. Designed for use with these modern dust respirators, each of the three types of filters has its own distinctive color. The color shows through the transparent Dustfoe and open Comfo filter containers and permits inspection at a glance of the filter-type employed, without removal from the respirator.

Thus, states the manufacturer, the filter-type is constantly in view for worker, foreman and safety inspector, helping to assure correct filter-use for each type of job. Workers are able to quickly associate color of filter with its dust and fume protective classification. Storekeepers issue the correct filter to each worker by color—quickly, easily and without error.

Filters furnishing U. S. Bureau of Mines—approved protection against all dusts (including toxic dusts, lead, cadmium, magnesium, etc.) are light red in color. Light green indicates M. S. A.'s approved protection against fibrosis-producing (silica, asbestos) and pneumoconiosis-producing dusts and mists. Grey is the color of the M. S. A. Comfo Metal Frame Respirator Filter, used only in the Comfo, and approved by the U. S. Bureau of Mines for protection against toxic fumes from molten metals.

Further details on M. S. A. Colored Filters are available from Mine Safety Appliances Company, Dept. MF, Braddock, Thomas and Meade Streets, Pittsburgh 8, Pa.

Metallizing Non-Conductors

A new ceramic type composition produces electrically conductive coatings that may be applied to a wide variety of non-conductors including glass, plastics, porcelain, soapstone, wood, cloth and paper.

Developed by the Electrochemicals Department of E. I. du Pont de Nemours & Company, these new coatings are now being manufactured commercially.

They can be applied to non-conducting base materials by spraying, dipping or brushing, followed by air drying and, in some cases, baking.

Containing silver powder, the new coating produces a surface of low electrical resistance and high conductivity. With these properties, the coatings are valuable for use in electrical condensers and other units employed in electrical circuits. Aging, or exposure to sulfides encountered in many electrical applications, has only slight effect upon their conductivity.

Several different formulations of the new material are being produced, each designed to meet the varying requirements of different basis materials and degrees of adhesion and film toughness. The coatings are dull, metallic gray in appearance.

A thermoplastic conductive cement is one interesting form. Others include a conductive coated cloth and a flexible conductive film. Four distinct types are being produced commercially. Other formulations are available for evaluation purposes as laboratory samples and specimens of these are obtainable.

Gold Plating Process

Developed by Alrose chemists after 20 or more years of scientific and practical research, The Trushade Process introduces an industrial gold finish that can be applied quickly and economically.

The process consists of Trushade 24 kt. gold and Trushade hard and 14 kt. alloys. The former is metallic gold suspended in an aqueous medium for use in preparing 24 kt. and alloy plating solutions. The latter are alloy metals also suspended in an aqueous medium and are for use in conjunction with Trushade 24 kt. gold in preparing alloy plating solutions.

Trushade eliminates the loss incurred in cutting down gold and its efficiency is claimed to be far higher than prepared salts such as gold chloride and gold cyanide. This process also allows a greater flexibility of application in gold plating operations and tests based on government specifications show acid resistance up to 3 hours on a 70 second application.

Quality and gold content of both Trushade gold and alloys are certified.

Further information may be obtained by writing to Alrose Chemical Co., Dept. MF, Providence, R. I.

Fluoboric Acid

Fluoboric Acid, HBF_4, is now offered by Special Chemicals Division of Pennsylvania Salt Manufacturing Company, Dept. MF, Philadelphia, Penna., under trade name "Pennsalt FA 42" as a 42% solution containing a slight excess of boric acid for stabilization it is a clear colorless solution having a Sp. Gr. of 1.33. Known in the literature also as borofluoric acid and borohydrofluoric acid, its suggested uses are in the control of acidity in fluoborate electroplating baths, preparation of various metallic fluoborates, pickling agent and preparation of catalysts for esterification, polymerization, and condensation reactions. Available in commercial quantities, in glass carboys.

Du-Lite "ZN" Process

The Du-Lite "ZN" process was developed by Du-Lite Chemical Corporation, Dept. MF, Middletown, Conn., to meet the demand for a simple chemical method which would produce an attractive, durable black finish on zinc and zinc alloys. The finish produced by this method is a metallic oxide, deep black in appearance, adhering strongly to the base metal so that this finish is satisfactory in normal use. It is not recommended for constant exposure to the weather unless protected by lacquer.

The "ZN" finish is of value as a base for paint or lacquer. Such coatings applied directly to unprepared zinc surfaces is not satisfactory because of chemical action which results in blistering and peeling.

The "ZN" solution is stable and non-toxic. Simple equipment may be used for processing. The standard instructions indicate the simplicity of the process. It is suggested, however, that samples of the parts to be finished be submitted for finishing in the Du-Lite Laboratory so that a definite procedure may be recommended to produce the best results.

New Non-Electric Cleaners

A new group of metal cleaners has been made available to metal products manufacturers and electroplaters, by the Hanson-Van Winkle-Munning Co., Dept. MF, Matawan, N.J. These cleaners have been designated as NL cleaners to distinguish them from the others made by the same company. They are not electric cleaners, but are designed for cleaning metals either by soaking or in washing machines.

These cleaners are the result of studies in plants under practical operating conditions and have successful performance records in back of them. They do what is claimed for them.

Each cleaner is prepared in two forms so that it will give the quickest and best results when used in still tanks or in power washers and tumbling barrels. The present group of NL cleaners is as follows:

Aluminum and Magnesium Cleaners

NL 1915 *for Still Tanks and NL* 1915-*P* (*for Power Washers*)

These cleaners have been very successful for cleaning aluminum and magnesium. They are used largely as the cleaner before anodizing due to their speed, thoroughness and non-corrosive properties. One plant reports cleaning in 25% of time of next quickest material tried. Another plant reports allowing aluminum parts to remain in the cleaner for over ¼ hour without etching. Still another plant reports rapid removal of sprayed primer coats from aluminum, satisfactorily. The NL 1915-S is perferred for removing zinc chromate primer from aluminum.

Cleaners for Steel and Iron

NL 1916 *and NL* 1916-*P* (*for Power Washers*)

These are ferrous metal cleaners for still tanks and power washers, especially designed for rapid and thorough cleaning of steel shell cases. They are generally useful as a soak cleaner for steel, having a much longer life than the usual alkali soaks.

NL 1918 *and NL* 1918-*P* (*for Power Washers*)

These are cleaners for steel prior to various Parkerizing operations. They are low free alkali cleaners which clean thoroughly and lead to more uniform Parker coatings.

Brass Cleaners

NL 1917 *and NL* 1917-*P* (*for Power Washers*)

These materials are suited for cleaning and brightening brass, including soldered parts. They are used successfully in oblique barrels to produce a bright dip effect. One plant uses them on brazed work to alkali clean and prepare for bright dipping. They cut pickling time to 10% of time formerly needed.

NL 1919 *and NL* 1919-*P* (*for Power Washers*)

These are cleaners for brass cartridge cases, stainless steel, tin, etc. NL 1921 and 1921-P are recommended for cleaning and

de-oxidizing copper and aluminum. They are similar to NL 1917 and NL 1917-P, except that they produce a better bright finish on copper. They are also good for cleaning and brightening soldered parts.

How to Use NL Cleaners

Use all still tank or soaks at 6 oz. per gal. and at a full boil.

Use all power-washer cleaners at ½ to ¾ oz. per gal., depending upon the dirt load, at 165° to 175°F.

Replacement: In still tanks add 1% every 24 hrs. to replace dragout. In power washers this cannot be foretold. It is more efficient to use these cleaners with minimum daily additions until their cleaning rate has slowed down to about three times the new batch rate, and then dump. In still tanks this means a cleaner life of about 3 times that of ordinary soak cleaners.

The NL cleaners are all quick-acting, since they are properly selected alkalies containing especially effective surface active compounds. The P mixtures for power washers will clean thoroughly to meet any cycle with a minimum of foaming.

The cleaners are all easy rinsers. The alkalies used are selected, amongst other reasons, to avoid the rinsing difficulties of free caustic soda or the like without sacrifice of any of the so-called heavy duty features of such difficult rinsers.

Alkyl Aromatic Solvent

Curran Ordnance Research Laboratory who are the Manufacturers of Gunk, Self-Emulsifying Degreasing Solvents announce a new Alkyl Aromatic Solvent Concentrate. The Development Chemist points out that the new solvent is non-inflammable and non-combustible, has no low volatiles and forms sparkling clear solutions with water. The aqueous solutions are stated to be completely stable at elevated temperatures and have been conclusively demonstrated to inhibit rusting parts cleaned. The Alkyl Aromatic Solvent is said to be competitive in cost and is processed from non war-scarce chemicals.

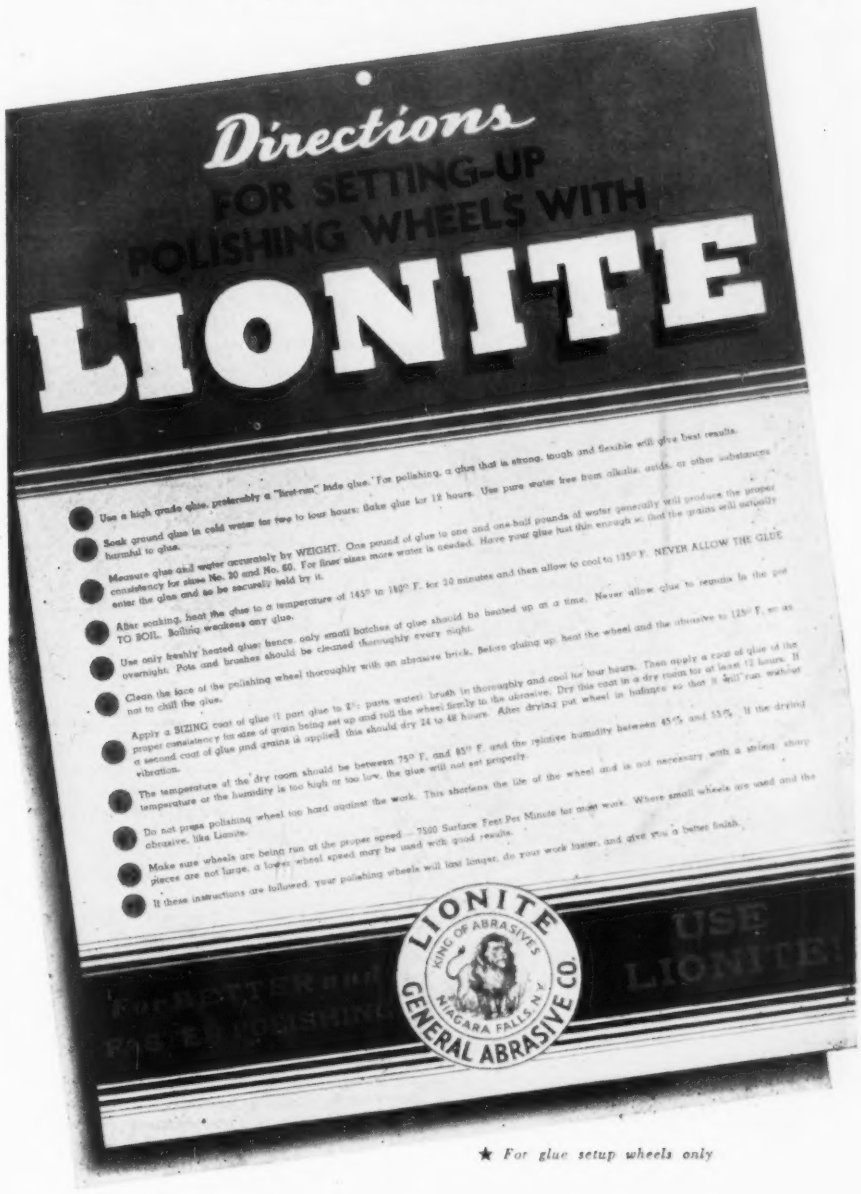
Further information may be obtained by writing to The Curran Corporation, Dept. MF, Dowling Building, Malden, Mass.

Eye Savers

A rugged, new, all-plastic goggle for general industrial utility. One-piece lens is of shatterproof methacrylate that withstands heavy impact . . . is highly resistant to pitting caused by sparks. Curved plastic frame fits the face snugly but comfortably, shields the eyes from every angle. Unique construction permits easy replacement of low-cost lens. Sturdily made to give long, safe service and reinforced with high-brass clip at bridge. Non-fogging. Flattering appearance and extreme light weight make it ideal for women workers. Other styles available for wear over prescription glasses. In writing for samples and price, specify Model 7.

Available through your own jobber, or Watchemoket Optical Co., Inc., Dept. MF, Providence 3, Rhode Island.

Have You the LIONITE Wall Chart*?



★ *For glue setup wheels only*

Hundreds of plants throughout the country have this LIONITE Wall Chart tacked up in their wheel setup room. They tell us that they get better results and their polishing wheels wear longer since they have been following the recommendations on the chart.

We still have a limited number of these Wall Charts available and shall be glad to send one on request to any company using glue-setup polishing wheels. If you would like one, we suggest you write for it promptly as our supply is limted.

Although the recommendations on the chart apply to any polishing grain, for best results we suggest you use LIONITE. LIONITE'S polyhedral-shaped grains are free from unproductive flats and slivers and wear down slowly. Uniformity from lot to lot is rigidly controlled. There is a size and grade to suit any polishing operation. Send us your inquiry.

GENERAL ABRASIVE CO., INC.

NIAGARA FALLS, N. Y., U. S. A.

Ingenious New Technical Methods

Presented in the hope that they will prove interesting and useful to you.

Center Scope Brings Optical Precision to Machine Shop Operations

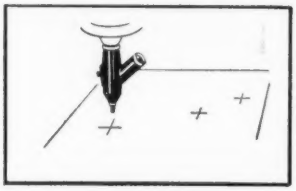
The Center Scope is an optical centering and locating tool that can be easily and quickly used on any machine to center work reference lines to a spindle axis. It permits accuracy to a degree never before obtainable, as the optical beam or line of sight is absolutely inflexible and cannot be distorted.

The Center Scope's easy accuracy eliminates many human errors, as the operator can see just what the cutting tool will do before it is actually fed into the work. It increases production, improves efficiency and prevents spoilage. There is no pressure on the work piece nor is it subject to wear or changes in temperature—for the Center Scope never touches the layout.

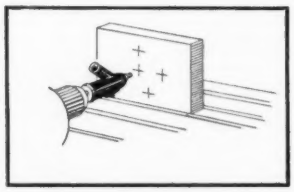
The Center Scope enables the operator to easily and quickly locate edges to a spindle axis, set-up faster and compensate for run-out. It saves vital hours in checking, inspecting and measuring when mechanical methods and tools are impossible to use. Its 45 x magnification allows operator to see ".001" and requires no technical knowledge or training to operate.

While there is nothing particularly new or ingenious about Wrigley's Spearmint gum, it is proving useful to millions of people in many new ways. Workers in war plants everywhere have found it helps keep them alert and relieves nervous tension and dry mouth while they are on the job.

You can get complete information from the Center Scope Instrument Company, 351 S. LaBrea Ave., Los Angeles, Calif., or Kearney & Trecker Products Corporation, Milwaukee, Wis.



ON A VERTICAL MILL—locating and centering height gauge or size block layouts. Permits jig borer accuracy on more machines.



ON A HORIZONTAL MILL—the ability to center a layout, edge block or rotary table plug while spindle is running. Permits quick and easy set-up for high precision work.

Y-109

men from the galvanizing division of the steel industry.

The present Governing Board of the Committee consists of:

D. A. Russell, Chairman — Youngstown Sheet & Tube Company

G. A. Brayton—Newport Rolling Mill Company

B. P. Finkbone—American Rolling Mill Company

C. K. Lytle—Tennessee Coal, Iron & R. R. Company

J. L. Schueler—Continental Steel Corporation

Robert Stoker—Carnegie-Illinois Steel Corporation

F. G. White—Granite City Steel Company

American Electroplaters' Society

Hotel Reservations for the Cleveland Conference

Now is the time to get a priority on your hotel accommodations for the annual conference of the American Electroplaters' Society to be held at the Hotel Cleveland, Cleveland, Ohio, June 12, 13 and 14.

The committee on hotel reservations has found it to be best for you to make your reservations direct with the hotel management in order to prevent any errors through indirect handling. Be sure you receive a written acknowledgment for your space, preserve it and be prepared to present it when registering at the Cleveland as it will be your identification for the space it calls for.

All members of the American Electroplaters' Society can obtain a reservation blank from their respective branch secretaries who will be provided with a supply at an early date.

Rates at the Hotel Cleveland begin at $3.05 up to $6.00 for single rooms. Rooms for two may be had from $4.50 to $8.00.

In addition to the headquarters hotel there will be found within easy walking distance the Hotels Carter, Hollenden and Statler.

Pittsburgh Branch

The Annual Ladies' Night party of the Pittsburgh Branch of the A.E.S. will be held Thursday, April 13th, instead of April 5th, as announced in our March issue.

Associations and Societies

American Zinc Institute

Galvanizers Meeting

The Galvanizers Committee has just announced that it will hold its fourteenth meeting coincident with the regular annual meeting of the Committee's sponsor, the American Zinc Institute. The Jefferson Hotel, St. Louis, Missouri, is the place chosen for both meetings, and April 17-18 is the time.

On Monday morning, a joint open session will be held, when subjects of mutual interest, to be announced later, will be discussed.

Robert Stoker of Carnegie-Illinois Steel Corporation and his program committee are now working on details for the closed sessions on Monday afternoon and Tuesday.

In announcing the meeting, *D. A. Russell*, the Chairman of the Committee, described it as a wartime conference which, because of the vital and timely topics to be discussed, is expected to attract to St. Louis a considerable number of technical and operating

Jackson-Lansing Branch

The Jackson-Lansing Branch of the A. E. S. is working diligently in order to make its First Annual Educational Session and Dinner Dance a success. The committee has secured three prominent speakers to conduct the afternoon educational session, and, have also arranged special entertainment for the ladies while the men are attending the session. The evening program will be Banquet, Floor Show and Dancing.

Those wishing to make reservations, please write to, Mr. Wm. H. Webb, 1924 South West Ave., Jackson, Mich.

Tickets $2.50. May 13, 1944

New England Regional Meeting

The Sixth Annual New England Regional Meeting of the A.E.S. will be held Saturday, April 22, 1944, at New Haven, Conn. The Educational Session starting at 2 P. M. will be held in Strathcona Hall of Yale University. The Banquet and Dance will be held at 7 P. M. in the Ballroom of the Hotel Taft. The women's program includes tickets for the matinee performance at Shuberts Theater.

Educational Session

2:00 P.M. *Dr. K Gustaf Soderberg*
Consultant, Metals Branch
War Production Board
Washington, D. C.
"The Metal Situation as it Affects the Plating Industry".

2:20 P.M. *N. E. Promisel*
Chief Metallurgist
Navy Department
Bureau of Aeronautics
Washington, D. C.
"Some Aspects of Finishing Aeronautical Equipment"

2:40 P.M. *Myron B Diggin*
Technical Director & Research Chemist
Hanson - Van Winkle - Munning Company
Matawan, New Jersey
"Regenerative Plating".

3:00 P.M. Intermission, for smoking, etc.

3:15 P.M. Clinic—Covering the following phases of Metal Finishing:
Equipment Engineering; Theoretical Considerations; Practical Applications; Business and Government Administration; Aircraft Finishes and Specifications; and Organic Coatings.
The Board will be comprised of the following experts:
M. B. Diggin, N. E. Promisel, K. G. Soderberg, E. Bucy, C. C. Helmle, T. Wieczorek. R. J. O'Connor, Technical Chairman.

Los Angeles Branch

Los Angeles Branch of the A. E. S. conducted its March 13 meeting in the form of a "bull session," with the membership indulging in open forum discussion of miscellaneous subjects dealing with metal finishing and deposition in general. No speaker on a specified subject was scheduled.

Chapter President *Emmette R. Holman*, who returned a few days prior to the meeting from a business trip to the Middle West, conducted the session and contributed interesting comment on some of the processes and methods he had inspected on his trip.

One of the subjects which precipitated spirited discussion at the session dealt with the white spots which one shop operator reported developed on dipped zinc articles. The use of a chromic acid treatment was brought up among other things in the lengthy discussion dealing with how the white spots can be avoided and what causes them.

Another subject concerned plating of iron on bronze. This brought forth considerable comment but few suggestions of practical value as most of the platers present professed very little knowledge of iron-on-bronze work.

Applications for membership were received from *Manuel Sanz* of the Consolidated-Vultee Aircraft Co., Downey, Calif; *A. E. Cochard*, Douglas Aircraft Co.'s Long Beach metal finishing department; and *B. D. Taylor* of the Wyandotte Chemical Co., Los Angeles.

With plating shop operators confronted with the increasingly aggravated problem of keeping equipment functioning in the face of tightening regulations which prevent the

UNICHROME*

"AIR DRY" RACK COATING

For every cycle where you want an air-dry insulation

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Toughness—Withstands repeated flexing and shop handling—cuts cleanly and easily at contacts.

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Unichrome Quick Dry Stop-Off 323—for chromium and other plating work requiring a stop-off that can be peeled off after use.

Unichrome Resist—a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

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How can you be sure that masking of parts is being handled most efficiently and economically in your plant? The new "Manual of Protective Coatings" offers detailed information which will clear up many points which may be open to question in your mind. A copy of this unusual book will be sent to you immediately and without obligation if your request is made on your company letterhead.

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purchase of new machinery, *Earl Coffman*, chairman of the educational committee of Los Angeles Branch of the A. E. S., presented a speaker at a recent meeting to discuss the subject of maintaining and repairing equipment in plating shops.

The man selected to tell Southern California platers how to keep their plants going and get more out of their machinery was *Earle F. Sweinhart* of the *Superior Electric Co.*, a firm which specializes in repairing and renovating electrical machinery for plating and welding shops. He offered much valuable advice concerning plating generators and rectifiers, energy hook-ups and methods of installing and maintaining machinery by which platers can increase the life and efficiency of their setups.

Mr. Sweinhart pointed out that all too many shop operators install the generators under the bench or in some inaccessible spot and do not give it a thought until it gets out of order. He stated that his company, as well as others in that field, are anxious to have shop owners help themselves in the matter of generator and rectifier repairs so that they can do their own work in getting it back in functioning order. Most electrical repair firms, he declared, are working at three times their peace-time schedules and cannot get around to handling all jobs.

Dust from the brushes, he pointed out, has a tendency to lodge in the brush holders, resulting in poor plating. If such a condition is permited to continue, he warned, the load becomes tremendous and a condition of "firing" may result. This, he said, presents a tough renovation job, requiring that virtually all brushes be removed from the commutator and cleaned individually. The brushes, he suggested, should be checked daily. Peace-time checking schedules will not suffice, he stated, since the generator in most shops now is doing three times as much work.

One of the most common reasons why a generator will not start or build up prope in the morning, the speaker declared, is t acid fumes, uniting with moisture, caus sticky, gummy substance to form on s copper. He said a stiff brush with abra will readily remove this gummy substan

To facilitate inspection and servicing generators, he advised that each genera be mounted from six to 18 inches above t floor, preferably on a block or pier of co crete, and that sufficient space be provid to enable the inspector to walk around t unit.

Concerning rectifiers, Mr. Sweinhart sa that overheating is one of the chief reas they get out of order. He recommended th the rectifier be placed so that exhausting the outside air is possible and no exhaus air will be redrawn into the unit. If the ex haust is thrown into the room, pre-heate air will eventually be taken in by th rectifier.

He predicted that in the future, many mo jobs than at present will be handled wi the generator or rectifier connected direct to the tank, thereby eliminating the nee for a rheostat and putting the energy direct on the work to be plated. This does not sig nify, he warned, that the generator shou be close to the tank. "As a matter of fact" he said, "the best setup is to have the ge erator in a separate room, or have th generator outside and the plating tanks in side. If necessary, build a wall to separa the two. Have the supply of air for th rectifier come from outside the plating room."

Electrochemical Society

The Eighty-Fifth Convention of The Ele trochemical Society will be held April 13 14 and 15 in Milwaukee.

Dr. R. M. Burns, President of the Society and Assistant Director of the *Bell Tele phone Laboratories* in New York City, will be in charge. The theme of the Convention will be "The Electrochemist's Contribution to the War Effort." The main technical session will be on "Powder Metallurgy." Millions of machine parts, small complicated gears, are being produced by powder metallurgy cheaper and better than by older casting methods. Of special interest is the use of powder metallurgy in making here tofore considered impossible products such as tools of tungsten carbide, harder than any substance except diamond,—also new combination products, partly porcelain and partly metal. Four other sessions will be held on "Corrosion," "Electrolytic Cells" and "Hard Chromium Plating."

Honorary Membership in the Society will be bestowed on *Paul J. Kruesi*, President of *Southern Ferro Alloys Company*, Chattanooga, Tennessee, and *Willis R. Whitney* of the *General Electric Company*, Schenectady, New York. The Young Author's Cash Prize and Book Prize go to *Walter G. Berl* of *Carnegie Institute of Technology*, Pittsburgh.

Headquarters of the Convention will be the Hotel Pfister and the estimated attendance will be between 400 and 500. *Mr. P. Deren* is chairman of the Local Committee.

Manufacturers' Literature

Engineering Bulletin

The *Lima Electric Motor Company*, Dept. MF, Lima, Ohio, announces the release of an 8-page illustrated engineering and data bulletin on the Lima Magnetic Polishing Lathe.

This bulletin explains in detail the principle and method of operation of these units, and is illustrated to show the method of application of the magnetic chuck. It also illustrates several different types of face plate applications for holding work to be polished, burred or lapped.

V-Belts

A four-page folder on its line of V-belts, featuring information about its recently announced wire grommet type, has just been published by *The B. F. Goodrich Company*, Dept. MF, and is now available upon request.

The wire grommet V-belt is an exclusive development of the company, the result of research engineering into special power problems. Twin cores of endless steel wire twisted on itself form the grommets, which are kept at a uniform distance from the sides of the belt throughout its length. The grommets are covered with counter-balancing and insulated cord.

Wire grommet V-belts are built with exceedingly high tensile strength, high resiliency to resist shock, and assure but little permanent stretch. These features, together with other advantages of grommet construction, allow a considerable increase in horsepower ratings over the conventional type V-belts.

The grommet type V-belt is being furnished only on special jobs where it has been decided by belting engineers that standard belting cannot be used.

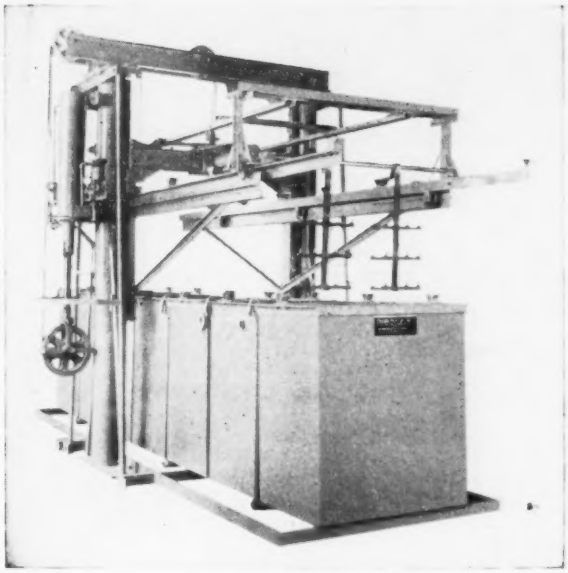
Selecting Nozzles

Designed as an engineering guide to the selection of exactly the right spray nozzle for any purpose, a new 32-page catalog is now available to users of spray nozzles and related equipment. Published by *Spraying Systems Company*, this new catalog details spray characteristics, dimensions and performance data on an exceptionally complete line of standard spray nozzles. Also described are special purpose nozzles, made of a variety of materials, as well as accessories such as strainers and adjustable joints.

Nozzles are fully illustrated to show construction and kind of spray pattern produced. Written specifications on each nozzle are supplemented by tables showing capacities in gallons per minute and spray angles at various pressures for all the types and sizes available.

Also carried in the catalog are descriptions of humidifying assemblies, roof spraying systems, and cooling tower and spray pond assemblies. Several tables of useful engineering data complete the book. A copy of Catalog No. 22 may be obtained by writing Spraying Systems Company, 4039 W. Lake Street, Dept. MF, Chicago 24, Illinois.

Crown Pick-up Unit



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Samples on request.

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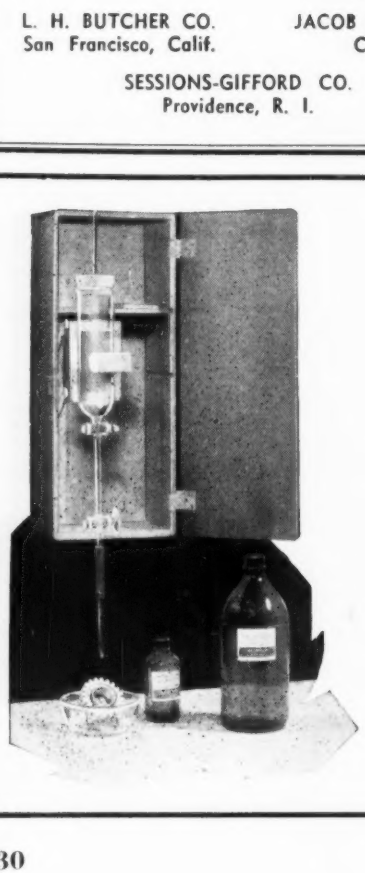

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News from California
By FRED A. HERR

Metal finishing, particularly in the field of hard chromium plating of truck parts, and metal spraying techniques figured prominently among displays of 40 manufacturers and distributors at a two-day *Truck Maintenance Show* sponsored by the Automotive Council of Los Angeles in cooperation with O.P.A. on March 10 and 11. The show was strictly educational in purpose, emphasizing ways and means whereby truck operators can keep their vehicles rolling.

Hard Chrome Engineering Co. of Los Angeles presented a display of hard chrome-plated crankshafts, liners, cylinder blocks and other automotive parts, with *C. L. Tanner* and *C. P. Graham* in charge of the booth.

How a worn crankshaft can be built up by metal spraying was demonstrated in an exhibit sponsored by *Metallizing Co. of America, Inc.*

Tivit Products Co., a new entry in the metal processing and industrial chemical field in Southern California, displayed specialized cleaning units and tanks for metal parts.

Kelite Products, Inc., exhibited cleaning materials and demonstrated the firm's method of pH control, with engineers *Robert Gardner* and *Jean Glauthier* and chemist *William Van Patten* representing the company.

Other exhibits were sponsored by *Magnaflux Corp., Oakite Products, Inc.*, and *Cee-Bee Chemical Co., Inc.*

Development of the metal industry on the Pacific Coast is brighter than in any other section of the country, *W. H. Eisenman* of Cleveland, O., secretary of the *American Society of Metals*, said on his arrival in Los Angeles on March 13 for a study of war industries and probably post-war production.

Generally speaking, Eisenman declared, the metal supply is easing. Copper, he said, is more plentiful for alloys. Tin, too, is easing up, and is more plentiful despite the Bolivian revolution which, he stated, had not caused an upset in the flow of tin to the United States.

Of interest to the plating industry was Eisenman's declaration that the easing of the tin situation means there will be more tin cans available for the food industry before long, replacing the glass containers which that industry was forced to use during the emergency. Eisenman pointed out that one problem concerning which the food and canning industries have expressed skepticism is the fact that wartime tin plate applied electrolytically on the sheet steel from which cans are made is considerably thinner than before the war.

Eisenman, and Dr. M. A. Grossman of Chicago, national president of the A.S.M. were programed as the principal speakers at a meeting of Golden Gate Chapter of the A.S.M. at the Engineers' Club, San Francisco, on March 20.

Tivit Products Co., a new manufacturer of equipment for metal processing and cleaning, has begun operations in Los Angeles with Bruce Wiswall as General Manager.

Tanks, steam pressure cleaners, portable pressure spray tanks, and a number of specialized units, including: Bench-size Tanks and Spray Booths for small parts cleaning and automatic feeding injector hook-up known as "The Tivit Economy Steam Cleaner" are now in production.

In addition to manufacturing its standard lines, Tivit builds tanks to specifications and maintains a field engineering service, under the direction of M. P. Greffoz, which offers assistance in the designing, layout, construction and installation of solution tanks and other equipment for metal processing and cleaning.

Addressing a recent meeting of the manufacturing and industries committee of the Los Angeles Chamber of Commerce, *Dr. V. V. Krivobok*, consulting metallurgist of the *Lockheed Aircraft Co.*, Burbank, Calif., predicted that in the post-war period steel will face increased competition from aluminum and magnesium alloys.

Pointing out that alloys developed during the past two years are 48% to 65% stronger than pre-war alloys, Dr. Krivobok declared it will be difficult for steel to displace metal of such light weight combined with sturdy strength.

Franklin M. Page, Jr., assistant manager of *Solar Aircraft Co.*, San Diego, Calif., has been awarded a prize in the form of a $1,000 check from the firm's board of directors for perfecting improved pickling solutions to clean stainless steel and other metals.

The award climaxed four years of effort on the part of Mr. Page to save man hours in the pickling process and to eliminate damage to critical metals. Mr. Page studied at the California Institute of Technology and was active in the aircraft chemistry field in Los Angeles before joining the staff of Solar Aircraft Co.

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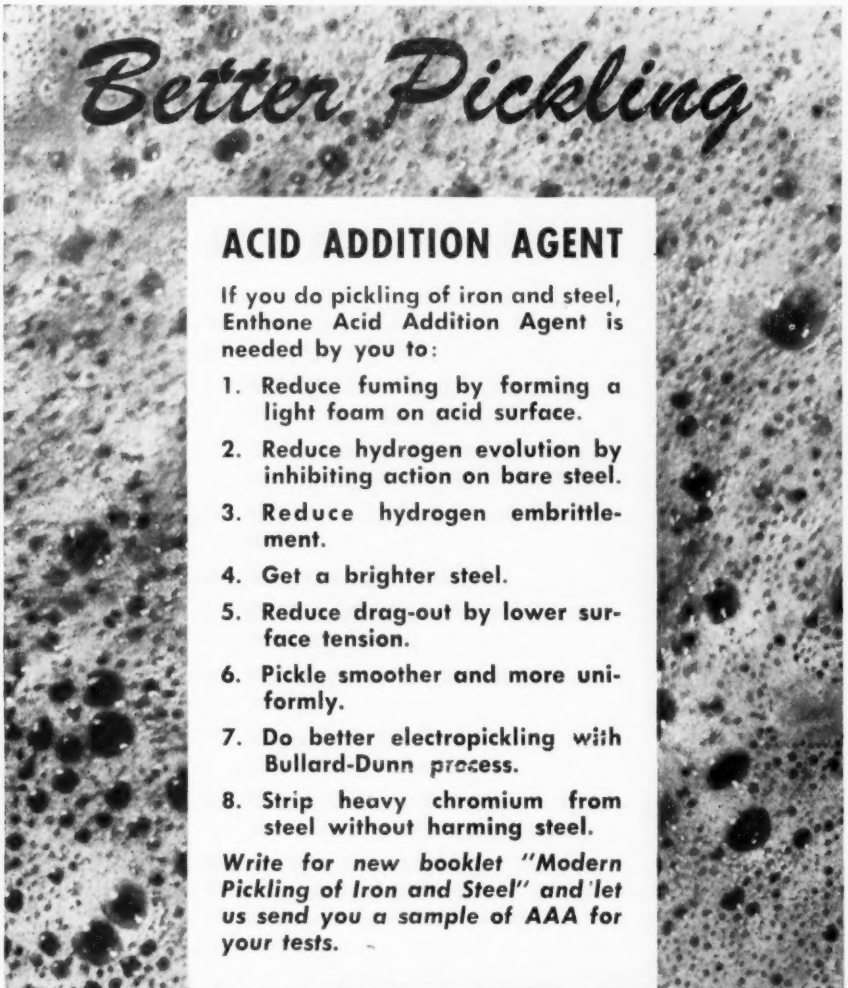
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Obituary

Hedley J. Richards

Hedley J. Richards, age 78, retired Vice-President of LaSalco, Inc., St. Louis, Mo., passed away suddenly March 20th

Mr. Richards came to this country at the age of twenty and was actively engaged in the Electroplating Industry for forty-five years.

He was a member of the American Electroplaters' Society and served as Editor of the Monthly Review during 1917-1918.

Mr. Richards was very much interested in poetry, both reading and writing, and some of his poems have been quoted Internationally.

Funeral services were held from Armbrusters, Clayton, Missouri on Thursday, March 23rd.

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A.E.S. CONFERENCE
JUNE 12 - 13 - 14
CLEVELAND HOTEL CLEVELAND, O.

ANTIQUITY OF TOOLS

(Continued from page 209)

It will be observed that handcraft labor was the first stage of the development of human power and that machinery has been its last and highest. The uncivilized man began with a stone for a hammer and a splinter of flint for a chisel, each stage of his progress being marked by an improvement of tools. Every machine calculated to save labor or increase production was a substantial addition to his power over the material resources of nature, and every extension of machinery has served to introduce new classes of the population to the enjoyment of its benefits. Civilization has replaced, little by little, the crude contrivance of old by the varied implements which subserve man's many wants in these more artificial days. The rough tools and weapons of stone, bone or horn, gave place to others of bronze, iron and steel. The cave was forsaken for the hut, and in turn to be left for the house of brick or stone. The wild hunter, fisherman and shepherd has been followed by the civilized man of today and our study of tools and weapons enable us to trace the stage of human progress.

If the toolmaker of a thousand years ago could return today and behold the improvement in tools and weapons that have been made since his time he would be astonished, astounded and amazed. What would be his surprise if he could visit one of our modern Pittsburgh machine shops? He would find most of his old hand occupation gone. No need now for the stone hammer and the splinter of flint for a chisel.

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BY USING a solenoid-loaded contact tongue, with the pull of the solenoid governed by a rheostat on the valve motor shaft, the Microtherm (lower picture) is able to position the Proportioning Valve (upper picture) so as to satisfy exactly any change in demand. Features include simple construction, no relays, and maximum power at all points of valve stroke. "Hunting" is eliminated and the valve is positioned quickly with "micrometer accuracy."

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Business Items

In connection with its extension program to provide still further service to the metal working industry, *Oakite Products, Inc.*, New York, announces the appointment of *Gerald A. Lux* to its technical staff. He will make his headquarters in New York.

For two years a research associate of the American Electroplaters' Society at the National Bureau of Standards and with many years' experience as a development engineer, chemist and research director in connection with metallurgical and chemical problems involving the use of alkaline and related cleaning compounds, Mr. Lux will devote a large part of his time to field work in an advisory capacity on special problems and developments. In addition, he will conduct research studies on metal surface preparation and finishes in Oakite's Research Laboratories in New York.

A. H. Kean, formerly with the *Bridgeport Safety Emery Wheel Co.*, in Connecticut, has been appointed general manager of the *Edward A. Lynch Machinery Company* in Ardmore, Pa.

Bob Leather of the *Lea Manufacturing Co.*, 16 Cherry Avenue, Waterbury 86, Conn., has announced that plans are being made to hold the *Leacrest Party* on Saturday, May 6, at Bethlehem, Conn.

In the past this Party has been one of the outstanding entertainment features of the plating and finishing industry, and it is hoped for a large gathering at the 1944 outing.

Detailed information is obtainable by writing to Bob at the above address.

The *Foxboro Company*, Foxboro, Mass., makers of industrial instruments for measuring, recording and controlling variables in industrial processes, announces the appointment of *Mr. Charles Schwarzler* as Manager

of the Export Department, succeeding Mr. Henry B. Moelter who died, January 20th, following a brief illness.

Mr. Schwarzler, formerly manager of the Sales Promotion Department, is a trained engineer, with ten years of experience in the application, promotion and sales of Foxboro Instruments. He has already assumed his new duties, to which he brings a background of varied and useful experience

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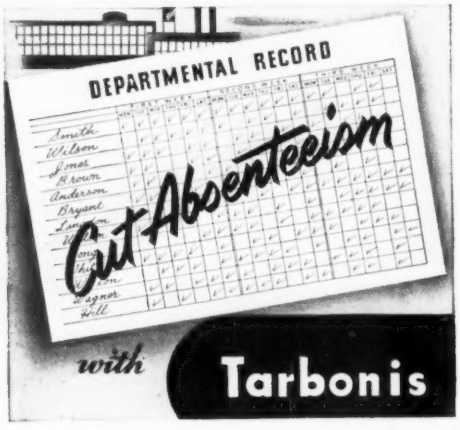

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Assets of *Wheelco Instruments Co.*, 847 W. Harrison St., Chicago, have been purchased by *Fred A. Hansen* and *Cary H. Stevenson*, vice-presidents of the *Lindberg Engineering Co.*, Chicago, and several associates. The business of the industrial instruments firm will be continued at the same location under a new corporation, the Wheelco Instruments Company.

Officers of the new company are Hansen, president; Stevenson, secretary and treasurer; and *Richard Schoenfeld* and *Theodore Cohen*, vice-presidents of the old company, as vice-presidents. Schoenfeld will be in charge of sales and production.

Wheelco Instruments Company owns a six-story building at Peoria and Harrison Streets, Chicago, where it manufactures a line of industrial instruments incorporating electronic control. The new company will expand further into other industrial applications of electronics and supersonics.

The original Wheelco firm was formed in 1936 by a merger of Wheelco Vacuum Products Company, manufacturers of electronic tubes, and Thermo Control Devices Company, manufacturers of industrial instruments. Sales and engineering offices are maintained throughout the country.

Hansen and Stevenson will continue to be active in management of Lindberg Engineering Co.

The Roberts Rouge Co., Stratford, Conn., manufacturers of Buffing Compositions, announces to the trade that a physical and chemical laboratory has been established at the plant with modern and latest equipment installed. The laboratory will serve a two-fold purpose, first in the control of raw material purchased and second in development of new compounds and the control of manufacturing processes. While extreme care has always been exercised in the production of compounds this important feature will be stressed even more rigidly with the added technical control.

The laboratory will be under the supervision of *H. T. Leavenworth*, metallurgist and industrial chemist well known locally through his connection with Bridgeport Testing Laboratory which he established and operated successfully for a number of years.

The facilities of the new laboratory are freely extended to all customers of the company and it is sincerely hoped that they will avail themselves of this opportunity.

Anthony J. Rolleri has been appointed production manager of the Newark plant of *Maas & Waldstein Company*, producer of industrial finishes. Mr. Rolleri joined the company as a laboratory assistant 34 years ago and has served in almost every department, most recently as foreman of the Pigmented Lacquer Department.

D. J. Stewart, previously assistant general manager of *Barber-Colman Company*, Rockford, Illinois, has been made Vice President and General Manager, succeeding *Mr. Earle D. Parker*.

H. F. Collins, former assistant general superintendent of Barber-Colman Company, has been appointed Works Manager.

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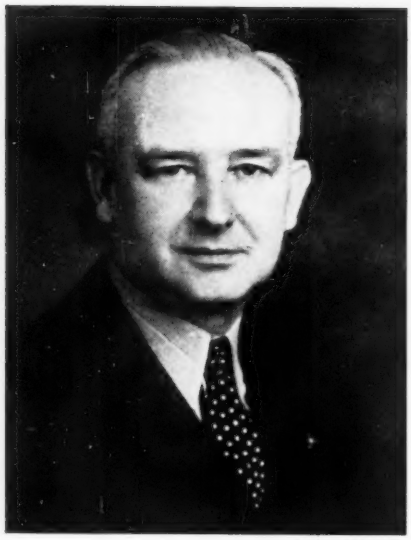
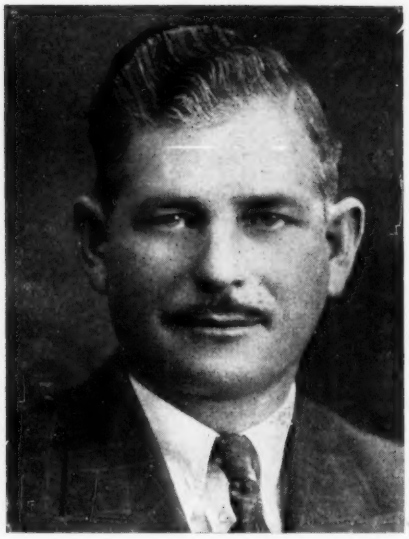


Horace Smith



George Wagner

William Bruhns

Horace H. Smith, of Newark, N. J., an authority on electroplating, who has just completed 40 years of service with Tiffany & Company where he had charge of its electroplating work, has, with *George J. Wagner* and *William Bruhns*, organized the *Surety Electro Plating Company* to engage in silver, gold, zinc, copper, nickel and cadmium plating, burring, anodizing and lacquer and synthetic finishing. The company's plant is located at 70 Sussex Avenue, Newark, N. J. Its officers are Horace H. Smith, president; George J. Wagner, treasurer, and William Bruhns, secretary, who also comprise the board of directors.

Mr. Smith for many years has been active in the promotion and development of electroplating and is perhaps the most widely known electroplater throughout the country. In 1913 he organized the Newark Branch of the American Electroplaters' Society and served as its first president for a term of two years. He is past Supreme President of the American Electroplaters' Society, the national organization, having served for a term of two years in 1929 and 1930.

Mr. Wagner has been engaged in electroplating and collateral lines for the past 26 years. His firm, known as the Hy-Grade Electro Plating Company, located at 35 Fourth Street, Newark, N. J., will continue in business in the same line. Mr. Wagner is the president of the Supreme Society of the American Electroplaters' Society.

Mr. Bruhns is president of the Newark Branch of the A.E.S.

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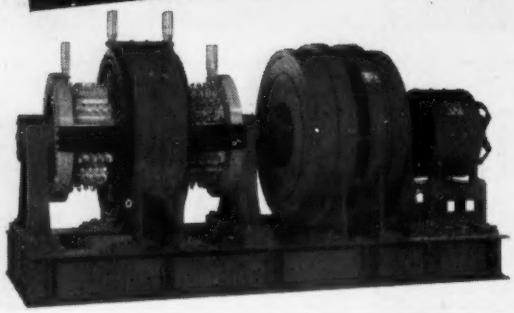

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New Book

Bibliography, with Abstracts, on Electrical Contacts 1835-1943

This extensive and valuable compilation of references to the literature on electrical contacts, together with a large number of abstracts of the material cited, resulted from the work of a committee of the *American Society for Testing Materials*, B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys, in developing standard methods of evaluating electrical contact materials and determining effect of variables upon their performance.

E. I. Shobert, II, Stockpole Carbon Co., was in charge of the work and cooperating very closely were *George Durst*, General Plate Division of Metals and Controls, Inc.; *S. G. Eskin*, Robertshaw Thermostat Co.; and *F. R. Hensel*, P. R. Mallory and Co. Many of the abstracts were taken from *Science Abstracts* and *Chemical Abstracts* and various other sources but a large number were specially written.

A detailed index lists the items in the Bibliography according to problems covered which include the following:

Electrical Contacts—General
Contact Materials
Circuit Breaker Design & Testing
Relays
Stationary Contacts
Sliding Contacts
Miscellaneous Contact Applications
Contact Resistance & Temperature
Electric Arc as Applied to Contacts
Electric Arc in General
Spark Discharge
Glow Discharge
Low Voltage Arc
Contact Wear
Circuit & Circuit Parameters as Applied to Contact Operation

There is a complete author index for those who wish to follow the work of a particular individual. Many of the references are given both in the original language and in English. All abstracts are of course in English.

The intensive work involved in the preparation of this pamphlet is part of a technical project on the developments of tests for contact materials.

Copies of this 160-page, 6 by 9 in., publication in cloth binding can be obtained from A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia 2, Pa., at $5 per copy.

Chemistry of Engineering Materials

Chemistry of Engineering Materials by *Robert Leighou*. Fourth edition rewritten by 7 members of chemistry faculty at the Carnegie Institute of Technology. Published by *McGraw-Hill Book Co., Inc.*, New York, N. Y. Price $4.00.

Six Chapters (281 pages) deal with the metallurgy, properties, and chemistry of iron, non-ferrous metals, and alloys. The style of writing is descriptive and interesting. A knowledge of advanced chemistry is not essential for a fair comprehension of the processes described. The chapters "Corrosion of Metals and Alloys", and "Protective Metallic and Inorganic Coatings" totaling 62 pages contain information of specific interest to metal finishers. Other chapters such as "Abrasives", "Organic Plastics", "Organic Protective Coatings" and "Glue and Adhesives" are of supplemental interest. In all, the average shop man working in the field of metals can draw much technical information of value from this book.

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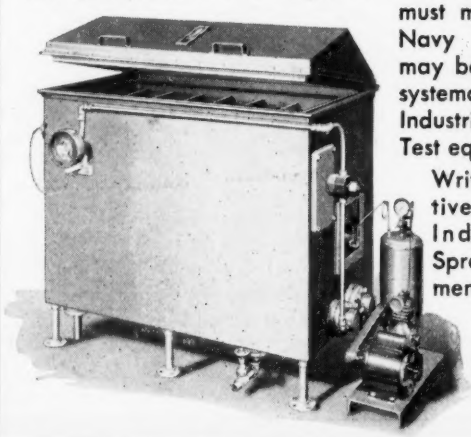

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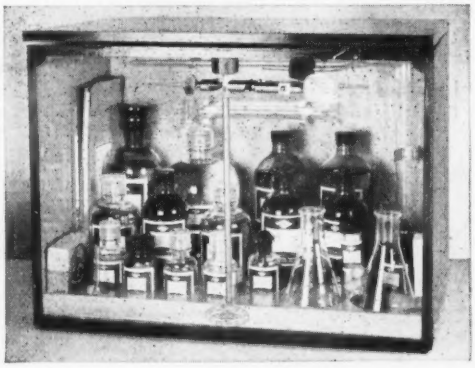

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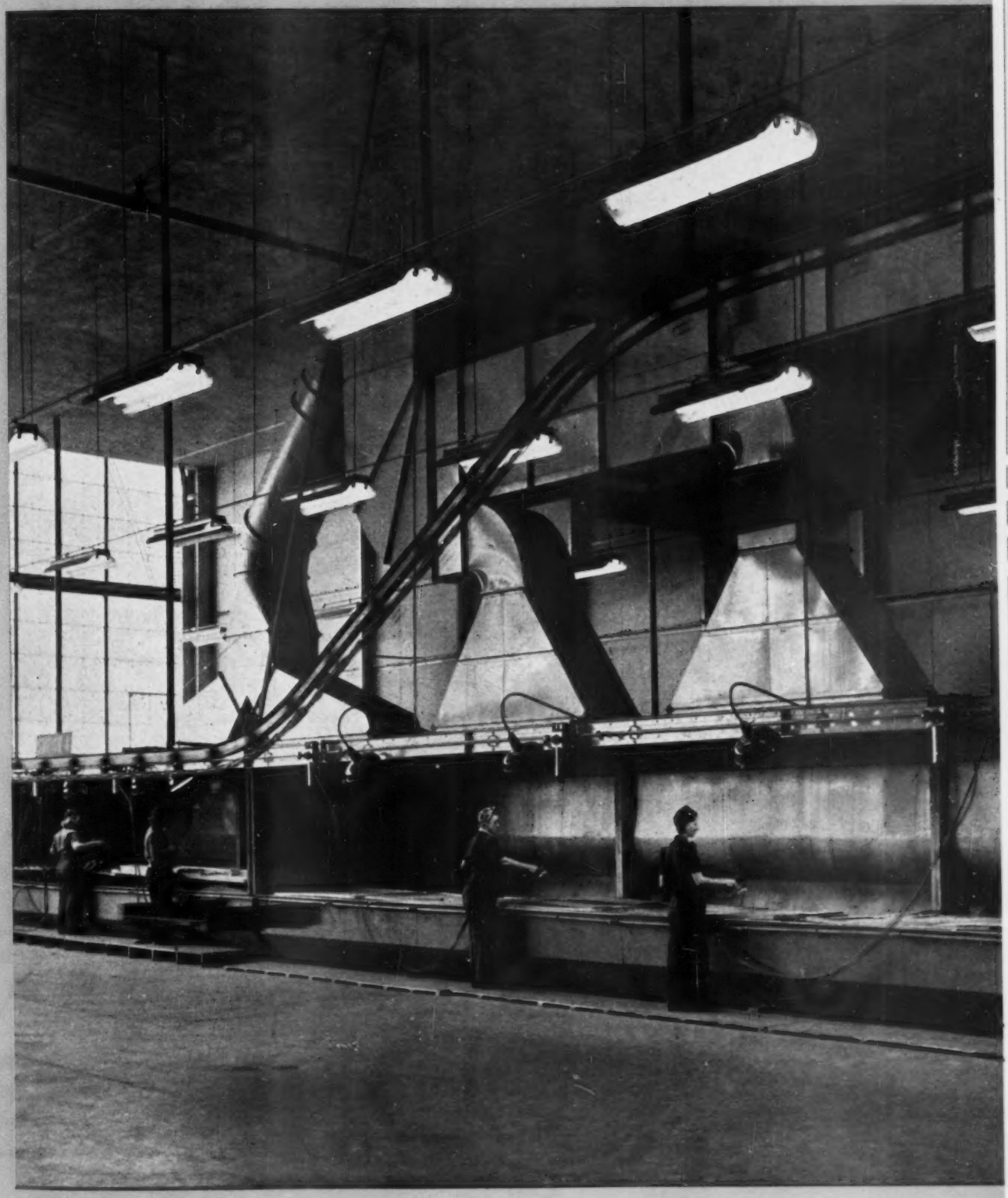

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We are already in consultation with many manufacturers who are now planning their postwar products. We invite you, too, to consult us about *your* postwar plans.

Zapon finishes or coatings cover an almost endless range of uses—many of which have required special research to meet an exacting, particular need.

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APRIL, 1944

CONTENTS

Coatings for Steel Cartridge Cases — By R. A. Brenneck and R. L. Norum 245

Dip Tank Construction and Operation — Conclusion 249

Protecting Pre-Plated Metals — By Kenneth Main 252

News from Washington 243

Business News 254

New Equipment 255

Patents 259

Manufacturers' Literature .. 260

Cover Photograph

The nozzleless type water washed spray booth illustrated provides a constant volume of exhaust and comfortable working conditions for women operators in one of our large fighter plane factories. *Courtesy of Peters-Dalton, Inc., Detroit, Mich.*

Finishing Material Sales

During the first part of each year the Department of Commerce, through the Bureau of Census, reports the sales of paint, varnish, lacquers, etc. for the preceding year. The statistics given are based on data from 680 manufacturing establishments and represent about 90 per cent of value of the total production of the finishing material industry as reported in the Census of Manufacturers for 1939.

Some of the data given for the year 1943 are, we believe, most interesting and significant. For example, total sales amounted to $568,620,999. This is a tremendous figure and indicates the size and importance of the finishing industry in the United States. Translated into volume, assuming an average cost per gallon, it amounts to something over 200 millions of gallons.

1943 Sales exceeded those for the preceding year by more than 38 millions of dollars and it was the third year since 1940 in which sales exceeded 500 millions of dollars. Previous to 1941, the largest sales reported were for 419 millions of dollars in 1937 and 412 millions of dollars in 1940. The tremendous increase in finishing materials production during our war years is thus indicated.

Industrial sales of paint, varnish and lacquer for 1943 showed an increase of more than 36 millions of dollars over those of 1942. Trade sales, on the other hand, decreased by approximately four millions of dollars. This undoubtedly reflects the increased amount of finishing done on war items as requirements for war equipment increased and American industry began to hit its stride.

The year 1943 was a very large one as the Bureau of Census data show. Almost astronomical amounts of finishing materials were made and used. We know that the production capacity, the equipment for application and the necessary labor is there. If the major part of the industry can remain as active after the war as it has been during 1943—and there is every reason to believe that it should—the finishing industry will have its greatest period of peace-time employment and prosperity.

L. H. LANGDON, *Publisher* • WILLOUGHBY G. SHEANE, *Associate Editor* • T. A. TRUMBOUR, *Business Manager*

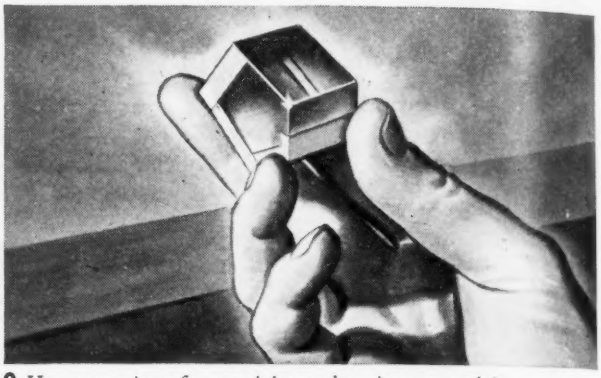
Do you know...?

Quiz on wartime short-cuts useful for peacetime production—No. 1

Q. Protective enamel on aircraft engine parts is dried at temperatures up to:

☐ 100° ☐ 300° ☐ 500°

A. 300°. To speed production, the temperatures in paint-drying ovens had to be raised—a masking tape was needed to stand up under high heat. Permacel's high-temperature masking tape helped solve this problem. Hangs on tight till the job is finished, then strips off clean, leaving a sharp, straight edge.



Q. How are prisms for gunsights and periscopes made?

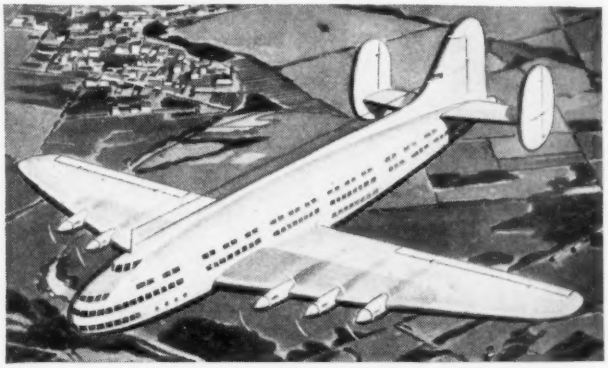
☐ Ground ☐ Cast ☐ Mined

A. Ground. In grinding prisms, protecting the polished surfaces is an exacting job. Recently, in one instance, rejects were cut from 60% to less than 15% by use of Permacel moisture-proof cloth tape on surfaces exposed to chemical bath. Thousands of yards of this Permacel tape (Utilitape) are also used daily to protect vital parts of planes and tanks during overseas shipment.

Q. He knows what kind of shell is in this canister by:

☐ Color of canister ☐ Shape of canister ☐ Seal

A. Colored, imprinted Permacel cloth tape (Jonflex) serves to identify shell in canister and holds the canister together. Today used on many other military items, this tough, quick-sticking, clean-stripping tape will likewise protect and identify many peacetime products.



Q. Postwar airliners will be kept on course by:

☐ Horoscope ☐ Gyroscope ☐ Anemoscope

A. Gyroscope. This device, used today on planes, tanks and other war machines, may tomorrow be guiding your private plane. A special Permacel glass tape (Glasflex) protects gyroscope motors against electrolytic corrosion, prolongs motor life, increases safety.

Q. One of the purposes of these wing slots is to:

☐ Provide lift ☐ Eject empty shells ☐ Ventilate the wing

A. Empty machine gun shells are ejected through these wing slots. To protect the gun mechanism against moisture and dirt, ground crews keep wing slots covered with a special cellophane tape.

Q. Which of these types of pressure-sensitive tape can help speed and improve *your* production?

☐ Paper ☐ Cloth ☐ Cellophane ☐ Metal ☐ Glass

A. All of these types of Permacel tapes are today used in war production. Many war uses will prove helpful in your business when you return to post-war work. Meantime, our research laboratory facilities are available to you for development of special tapes to fit war or post-war needs.

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NEWS FROM WASHINGTON—

By George W. Grupp
METAL FINISHING's Washington Correspondent

New Chemicals Added To PR No. 3 Direction 5 An amendment to Direction No. 5 of Priorities Regulation No. 3 was issued on February 18, 1944 for the purpose of making it clear that the Direction prohibits the extension of AA-1 and AA-2 blanket maintenance repair and operating ratings to secure materials on the list attached to the direction. Acetylene, carbon dioxide, glue, carbon tetrachloride, hydrogen gas, nitrous oxide, oxygen and trichlorethylene were removed from the amended direction. New items on the list are muriatic acid, sulfamic acid, Courmarin, magnesium hydroxide, magnesium oxide, pine oil, pine tar oil, gum resin, wood resin, gum turpentine, wood turpentine, and vanillian.

Excess Allotments Returnable To Field Offices Controlled Materials Plan Regulation No. 1 Direction No. 26 as amended February 15, 1944 provides that excess or unused allotments which originated with WPB field offices should be returned to such field offices. The amended direction also provides that excess or unused allotments may be returned by letter if it is impractical for the person returning the allotment to obtain a copy of Form CMP-32, which is the form used in making such returns.

Protective Coatings Export Procedure The War Production Board's Chemical Division announced recently the procedure of exporting protective coatings or raw materials used in protective coatings under Office of Economic Warfare licenses. Form BEW-119 must be used in making application for license to export finished paint, varnish or lacquer. This application must be submitted in quadruplicate to the Chemicals Section, Chemicals and Health Supplies Division, Office of Exports, Office of Economic Warfare. The applicant must state the principal components which are under WPB control and the end-use of the paints, varnish or lacquer for export shipment. To obtain the allocated raw materials to produce the paint, varnish or lacquer for export, the manufacturer must show on WPB-2945, filed with the WPB, the export license number. The same forms must be used for application to export allocated raw materials for producing protective coatings in a foreign country.

Bronze Powder Excluded from Order M-9 Order M-9 as amended on February 29, 1944 provides that the definition of copper and copper base alloy powder no longer includes flake type bronze powder as controlled by Supplementary Conservation Order M-9-c-3. As a result it is no longer necessary to file Form WPB-2959 requesting authorization to accept delivery of flake type of bronze powder. Conservation Order M-9-c as amended January 22, 1944 prohibits the use of copper or copper base alloy (a) in the manufacture of any powder except for non-decorative uses, or (b) for the production of any item that has been included on the combined List of Order M-9-c. Flake type bronze powder may be produced only for use in making non-decorative decalcomanias, shipbottom paint, and drift signals. It should be added that preference ratings and allotment symbols do not constitute authorization to manufacture or deliver flake type bronze powder, unless such manufacture or delivery is already permitted by the terms of Orders M-9-c and M-9-c-3.

End-use Information Required On Protective Coatings Users of synthetic resin finishes, lacquers and lacquer thinners must now give complete end-use information to their protective coating supplier when placing orders for these products the Protective Coatings Section of the Chemical Division of the WPB announced on March 13, 1944. End-Use List WPBI-217 may be used as a guide for the type of end-use information considered adequate. For certain special coatings (those containing phthalic alkyd resins, phthalate plasticizers, ethyl cellulose, chrome pigments and certain other critical raw materials), contract and specification numbers are required before allocations can be made.

Industrial Equipment Order Amended A new minimum preference rating of AA-5 or better, designed to curtail distribution, was established by Limitation Order L-123 as amended February 28, 1944. This amended order covers such industrial equipment as air filters, air washers, compressors, industrial dust collectors, electric motors and generators (fractional horsepower), fans, blowers and exhausters, flexible metallic hose, tubing and fittings, heat exchangers, and drying, and finish baking industrial ovens. The previous requirement was A-1-c or better.

Industrial Naphthas and Solvents Prices The Office of Price Administration removed industrial naphthas and solvents from Maximum Price Regulation No. 88 and placed them under Maximum Price Regulation No. 510. No change in ceiling prices from those previously established under Revised Price Schedule No. 88 will result from this shift which became effective February 28, 1944.

Paint Priorities Violations Under Investigation The WPB announced on February 24, 1944 that it had given a list of 700 paint manufacturers to the Federal Trade Commission for its investigation of violations of WPB priorities. It is reported that there has been a considerable diversion of critical raw materials from military to non-essential civilian uses. Measures may be taken against all those found guilty of priorities violations by the investigators of the Federal Trade Commission. Offenders may receive admonitory letters; they may receive a suspension order; or criminal proceedings may be instituted.

Paint Situation As Viewed By Belcher B. M. Belcher, Chief of the Paint, Varnish and Lacquer Unit of the WPB recently said: "We have evidence based on laboratory and field tests which indicates that paints made under Order M-332 are equal to, and in some cases superior to paints made under formulating methods prior to the war." It is his opinion that "future allocations of alkyd resins are going to be drastically curtailed for all civilian uses as a result of increasing military demands. On the other side of the picture," he continued, "there has been some easing of critical oils." "As a result of the increasing pigment difficulties," he added, "many industries, notably transportation, which have standardized on certain color schemes over a period of years, may be forced to operate under different colors." He explained that the pigment situation is due to a shortage of bichromate.

Phthalic Anhydride Production Stepped Up Because of increasing demands for military purposes the production of phthalic anhydride, which is used in resins, will be increased 15,000,000 pounds a year. The March allocation to alkyd and phenolic resins was 3,500,000 pounds; and in April it will be stepped up to 3,800,000 pounds.

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Coatings for Steel Cartridge Cases

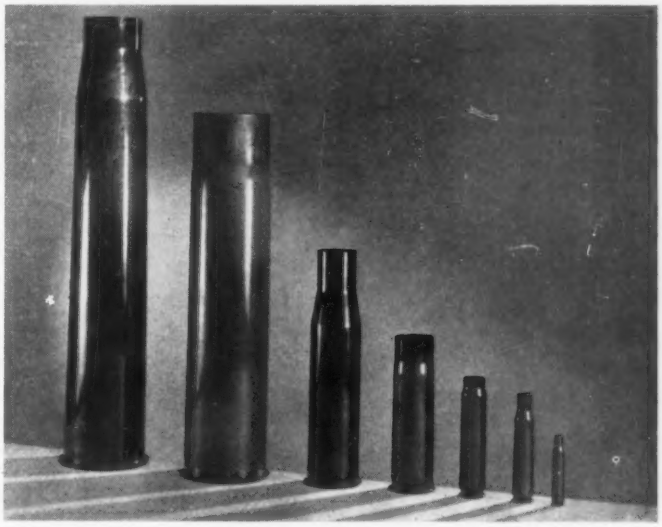
By R. A. BRENNECK and R. L. NORUM

Service Engineers, Bakelite Corporation, New York, N. Y.

INDUSTRY is well acquainted with the intensive search for replacements of critical raw materials in the production of our war equipment. One specific example of this important problem was the urgent need to convert from brass in the manufacture of shells and cartridge cases in order to save and make possible the use of the tremendous amounts of copper necessary in the electrical appliances of our planes, ships, tanks and other equipment. For instance, more than two miles of copper wiring are needed in every large bomber and over two million pounds of copper in every large battleship.

When the call for conversion came, the logical replacement for brass in the manufacture of cartridge cases was steel—both because of its greater availability and its lower cost. This call for conversion came to the steel industry at a time when it was already overworked in the effort to meet the production demanded of it. However, manufacturers all over the country, who had been tooled only for the production of brass shells, immediately began an intensive program of experimentation and study in order to develop the drawing and fabricating technique necessary to make satisfactory shells from steel—steel which has such different physical and working properties from brass.

After working for many months on the fabricating problem, the difficulties were overcome and satisfactory steel shells were produced. Then came the equally important problem of finding some type of protective coating for these steel shells. This coating would have to protect the steel from salt spray corrosion, would have to stand a wide variety of climatic conditions, including the daily extreme temperature changes of the tropics, and would have to be strong and tough enough to withstand the rough treatment received when being transported at the front in tanks, jeeps and trucks. It would have to be resistant to the corrosive chemicals produced by the powder charge on the interior of the shell. It would have to provide a smooth, completely thermosetting, non-softening coating which would allow the shell to be ejected easily from the breech of the gun even when the temperature in that gun breech reached 600° F. And, in addition to this demand for toughness, durability and resistance, the coating would have to be flexible enough to withstand the sudden expansion and contraction when the case was fired. This sudden expansion really corresponds to a terrific impact shock since, when the cartridge is fired, the metal of the case is forced out against the gun chamber in a split second to make a gas-tight fit and direct the full force of the explosion against the projectile. For example, the 105mm. case expands 0.010-0.020 in. in diameter when fired. Then, the case must contract sufficiently to allow rapid ejection from the gun barrel. The strong, tough protective coating would have to stand this tremendous shock without splintering, cracking or sticking.



Coated steel cartridge cases.

After a thorough investigation of many types of organic coatings by the Army Ordnance Department, heat-hardening resin solutions based on phenol and formaldehyde were selected as best because of their outstanding performance in meeting all the test requirements. These resin solutions are produced from carefully selected raw materials and are made under exact manufacturing control. In the production of the base resin, modifications are necessary to assure that the required coating properties are obtained. Thus, a pure phenol-formaldehyde resin which is highly suitable for a laminating varnish or molding material may be quite useless as a coating base. Likewise, the formulation of the finished liquid coating supplied to the shell fabricator for spraying or dipping involves the use of special diluents, solvents, plasticizers and other ingredients which insure satisfactory coating properties in high speed production.

These finishes, when properly applied and thoroughly baked, provide films which are extremely resistant to chemicals, strong solvents, most acid solutions and fumes and dilute alkalies. The films have successfully withstood many hours in salt spray solutions and in cold and hot water. They are extremely hard and smooth and resistant to abrasion and impact shocks, thus eliminating sparking hazards. Also of vital importance is their complete lack of thermoplasticity at high temperatures.

This basic type of finish has been known to a few coating specialists for the past thirty years for applications ranging from razor blade finishes to brass beds and from small food storage containers to tank car linings. This new use was, however, a radical departure in the manufacture of ammunition. The U. S. Army Ordnance Depart-

Equipment for spraying phenolic varnish.

ment in collaboration with technicians of the paint and varnish industry drew up a specification—U. S. Army Ordnance Specification AXS-736—requiring the use of a baking phenol-formaldehyde resin finish on cartridge cases and listing the requirements this finish had to meet.

Contracts were then let to various manufacturers to produce coated steel shells. Before the war, many of these manufacturers had made products very different from cartridge cases, such as brass doorknobs, steel pails, automobile bodies, washing machines, etc. Since the phenol-formaldehyde resin finishes are differenet from the ordinary paints and varnishes with which the manufacturers had had any previous experience and required special care in application, technicians of the paint and varnish industry developed detailed application instructions in order to insure the consistent production of properly coated shells.

Some of the problems in details of application involved in the two methods of coating steel shells—automatic spraying and automatic dipping—will be described here.

Cleaning Shells

Regardless of the method of application, the steel must be clean before the finish is put on. This matter of cleaning of the metal cannot be overemphasized. The best finish in existence will fail in performance if a poor metal cleaning job is done.

All grease and dirt deposited on the shell during the drawing process and subsequent handling must first be removed either by solvents, especially of the vapor degreasing type, or various commercial chemical degreasing agents. All scale and rust are removed by pickling and then the clean roughened surface is given a rust-inhibitive wash or metal pretreatment in a phosphate solution or an oxide film-producing reagent. This step is necessary in order to protect the freshly prepared surface between the time it is cleaned and the time the coating is applied.

Dip Application

After being cleaned, the shells travel on an automatic conveyor to the point at which the coating is applied. The shells should be dry at this time. In the dipping process, the shells are hung on a conveyor line by hooks which are inserted in the primer cap holes. The conveyor line carries the shells into a dip tank containing a low solids resin solution. The viscosity of the solution, the solvents used and the withdrawal rate from the tank are carefully controlled in order to insure a smooth and uniform coating having the film thickness of 0.0004 to 0.0005 in. required by Specification AXS-736. The shells are slightly tipped with the open end upward after they enter the dip tank in order that the inside will be completely coated. The shells are then withdrawn, being dragged along a sloping baffle plate in such a way that the heads of the shells break the surface of the varnish at about a 30 degree angle. This angle is gradually increased as the shells rise, until the last part of the shells are withdrawn vertically out of the solution. This insures good drainage and a uniform coating on the sharp edges of the primer cap hole, ejector groove and shoulder of the shells. The shells are allowed a short drainage period and then move along to one or several high voltage electrostatic devices which "detear" or remove the excess drainage material from the bottom of the shell. After the bead of excess material is removed, the shells are ready to be baked.

Baking Procedure

It is advisable to give the coated shells a short, low temperature preliminary bake of about eight minutes at 175°-200° F. in order to permit the solvents to evaporate gradually with a minimum of film disturbance. This preliminary drying helps considerably to eliminate blisters, pinholes and other film irregularities which would result were the coating subjected immediately to the higher polymerizing temperatures. Also, before this prebake, it is advisable to pass the shells over a battery of air jets which flush the solvent vapors from the interior of the shells. This prevents any possibility of hot vapors being trapped inside the shells and washing down the resin film before it has a chance to polymerize.

Directly after the low temperature bake, the polymerizing heat can be safely applied. This baking schedule ranges from 20 to 30 minutes at 350°-400° F. During this period a chemical reaction takes place in which the resin film changes from an alcohol-soluble, fusible form to a completely solvent-insoluble, infusible film.

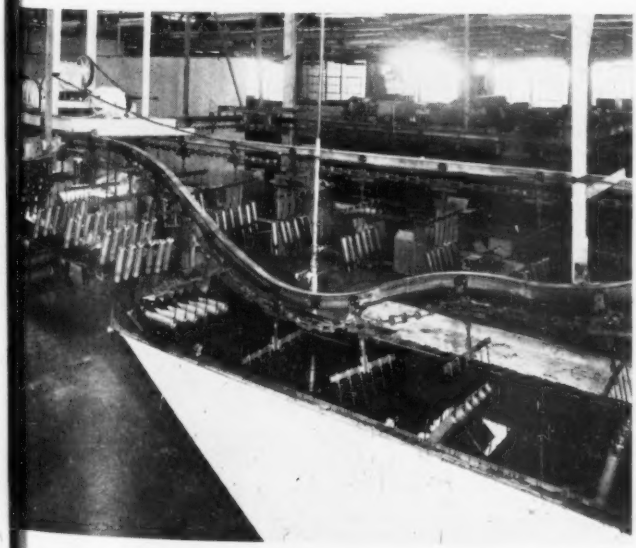
After thorough polymerization has been completed with the high temperature bake, the final step in an ideal coating system is to allow the cartridge cases to cool down slowly to about 225°-250° F. before being chilled to room temperature. The reason for this is that a slight shrinkage occurs when these thoroughly cured resinous films cool. If the cooling process is carried out too quickly, it is quite possible that severe strains will develop in the baked film. However, a gradual cooling allows the film a

better chance of adjusting itself physically to a permanent homogeneous form relatively free from internal strains. This cooling step can be handled very simply by the use of an unheated tunnel through which the cartridge cases can pass immediately after they leave the oven.

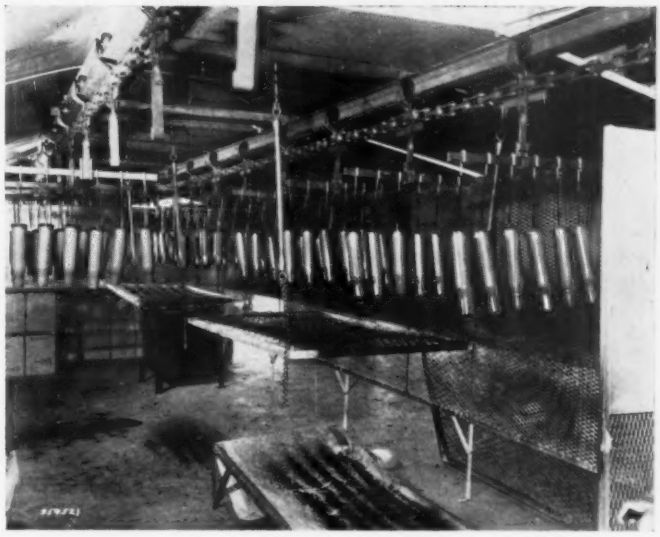
The baking details given above are general for several phenol - formaldehyde cartridge case coating materials. These resin solutions have a wide range of baking times and temperatures which can be used. Naturally, the exact time and temperature used will vary with the particular base resin and solvent combination employed, as well as with the size of the cartridge case being coated, the type of baking used and other specific details of a particular application.

As to the source of heat for this baking cycle, both accurately regulated gas fired, air circulating ovens and infra-red lamps have been used successfully. Very often particular attention must be given to the baking of the larger size cartridge cases. Due to the thickness of the metal at the base of these cases, temperature rises at this point will obviously lag behind those along the body of the shell and the thin open end. Thus, if the baking schedule is such that the film at the heavy base is properly cured, then the chances are that the coating at the thin section may be overbaked or toward the brittle state. On the other hand, if the baking schedule provides for the proper degree of polymerization of the coating on the thin section of the shell, then the film on the thicker sections may be underbaked and might possibly soften slightly when high heat and pressure are encountered in firing. However, this condition can be overcome by proper arrangement and construction of the baking oven.

Such difficulties can also be avoided by installing in the production line a specially designed bank of infra-red lamps or an electrical induction machine which would be concentrated on the heavy base of the shell in order to give that section a prebake. After this preliminary bake, the shells are given the bake required to produce the properly polymerized coating on the body and mouth. This baking procedure produces a uniformly baked coating on all sections of the shells.



Shells being dipped. Conveyor contour and baffle plate in tank insure complete coverage and proper draining.



Dipped shells passing over high voltage grid to remove drips.

Spray Application

In the spraying process, the clean and dry shells are set on a conveyor line of spindles. If these shells are handled at all after they are placed on the conveyor line, care should be taken that no grease or dirt is deposited on the clean surface. The spindles fit into the primer cap holes of the shells, holding them in a vertical position with the open end up. These shells then travel to the spray booth. As the shells pass in front of the spray guns, the spindles on which the shells rest are rotated. Two, three or four guns work simultaneously, one dropping down into the shell to coat the interior. The others are arranged in such a way as to rapidly and uniformly coat every part of the outside of the spinning shell.

"Detearing" is not a necessary step in spray coating, since there is no great drainage of the resin solution applied. The shells go from the spray booth to a battery of air jets to flush out the solvent vapors from the interior of the shell and then into the three-phase baking cycle. The same low temperature preliminary bake, high temperature polymerizing bake and gradual cooling recommended in the discussion of automatic dipping apply directly to an automatic spray process.

Many shell fabricators have been turning out steel shells coated with phenol-formaldehyde baking finishes at a high production rate during the past year. Cartridge cases ranging in size from 20mm. to 105mm. have been successfully coated and have proved their worth both in firing tests at various proving grounds in this country and in actual use in fields of action. The continued success of phenol-formaldehyde baking finishes on steel cartridge cases can be assured by the use of the highest quality resins and component materials which can be obtained, followed by the strictest possible compliance to the recommended application details.

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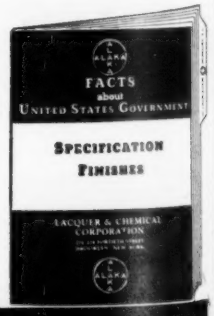

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Dip Tank Construction and Operation

CONCLUSION

SPECIAL REQUIREMENTS FOR CLASS A, B AND C TANKS

Requirements for Class A Tanks

(Area over 10 square feet.
See Article 10.)

141. Class A Tanks shall comply with the preceding General Rules.

142. If of over 500 gallons capacity and having over 25 square feet of liquid surface each tank shall be provided with an approved, automatically and manually operated drain in accordance with Articles 194-197. Automatic drains are also advised for all tanks of this class.

143. Tanks other than those included in Article 142 shall have an overflow pipe of not less than 3 inches diameter. (See Article 198.)

144. Tanks shall be protected by at least one of the following automatic extinguishing means:

(a) Automatic covers, in accordance with Articles 181-185.

(b) Foam extinguisher system, in accordance with Articles 186-189.

(c) Carbon dioxide extinguishing systems, in accordance with Articles 190-191.

(d) Water or carbon tetrachloride spray systems, in accordance with Articles 192 and 193.

Requirements for Class B Tanks

(Up to 10 square feet of liquid surface area. See Article 10.)

161. Class B Tanks shall comply with the preceding General Rules.

162. Tanks shall have an approved cover (Articles 181-185), manually or automatically operated as required by the inspection departments having jurisdiction, or an automatic extinguishing system. (Articles 186-193.)

163. Overflow pipes are advised for some tanks of this class. (See Article 198.)

Requirements for Class C Tanks

(Above 100°F. flash point.
See Article 10.)

171. Class C Tanks shall comply with the preceding General Rules.

NOTE. As very heavy compounds are contained in these tanks, especial attention should be given to the strength of the tanks and their supports.

172. Covers, preferably permanently attached to the tank, shall be provided where practicable. (See Articles 181-185.) Inspection departments having jurisdiction shall be consulted as to whether these shall be operated automatically as well as manually.

If manually operated, means should be provided for remote control of the covers, as well as control at the tank, unless tanks have an area of less than 25 square feet, or are considered but slightly hazardous.

173. If covers are impracticable and the severity of hazard and area of tank warrant, an automatic extinguishing system (See Articles 186-193) should be provided. Inspection departments having jurisdiction should be consulted as to whether such protection is called for.

SPECIAL PROTECTION

GENERAL NOTE. The following rules apply only as specified in the preceding rules; the selection of the particular form of protection herein specified is otherwise optional.

Automatic Covers

NOTE. Under some conditions, due to the conduct of the work or the presence of automatic conveyors entering the tank, automatic covers are not practicable so in such cases an approved automatic extinguishing system should be provided.

181. Covers shall be arranged to close automatically in case of fire by approved heat actuated devices and also means shall be provided to operate them manually.

182. Covers shall be of heavy noncombustible material or of tin-clad wood with tinning applied with locked joints. The covers should overlap the sides of the tank at least 1 inch and preferably have a recess or flange extending downward around the tank when it is closed. The cover should be securely but loosely hung on hinges or guides, due provision being made for the possible accumulation of obstructions on the moving parts. Large heavy covers should be provided with

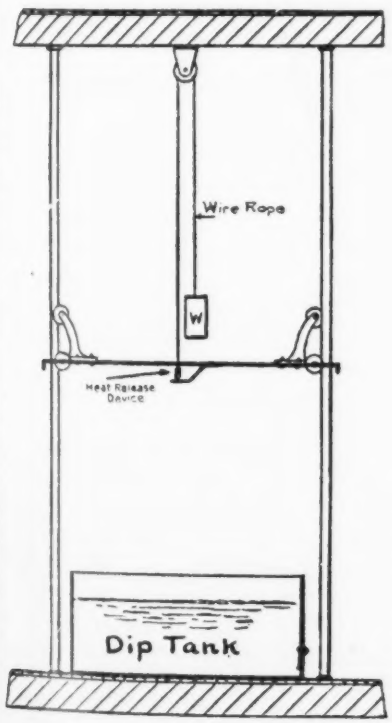

Fig. 4
A Class B tank with automatic vertically dropping cover. This form of cover permits of accessibility from all sides.

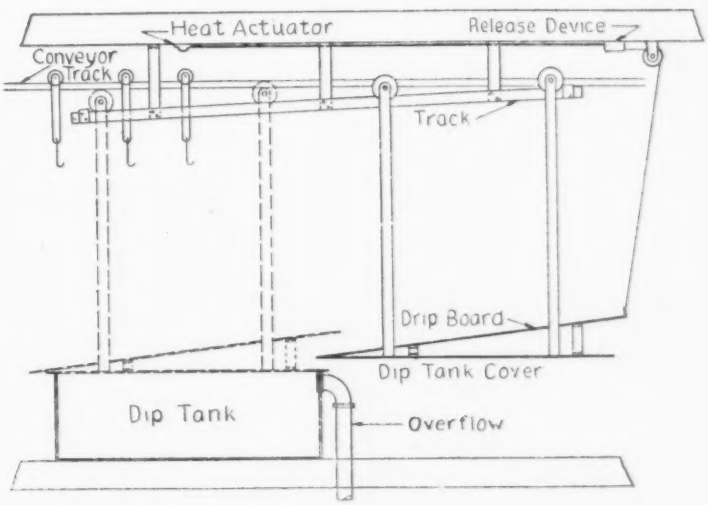

Fig. 5
A Class B dip tank with a drip board and cover combined, the whole covering the tank automatically in case of fire. This is applicable where goods are handled on a trolley track.

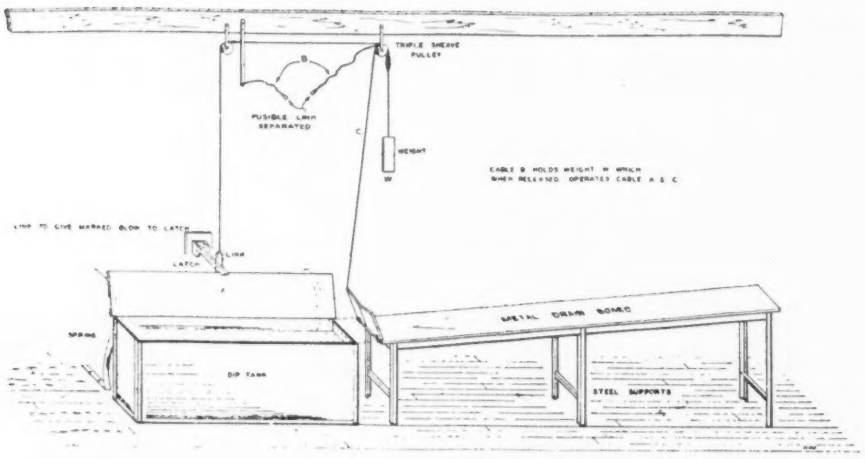

Fig. 6
A dip tank, automatic cover and drain board, with drain board arranged to prevent interference with cover. The fusible link in cord "B" has separated, weight "W" has lifted the hinged section of the drain board, and the latch is about to operate to release the cover.

counter weights where necessary to prevent injury to employees. Covers may be of the hinged, vertical drop, or sliding type. A sliding drip board operated automatically may serve as a cover if proper provision is made for tightly covering the tank.

183. Chains or wire rope shall be used for cover support or operating mechanism where the burning of a cord would interfere with the action of a device. Combustible cord may be used elsewhere. All pulleys, catches and other such fasteners should be of metal and where possible, attached to non-combustible mountings.

184. Where drain boards return drippings to tanks special means shall be provided to permit the cover closing tightly without interference.

185. Covers shall be kept closed when tanks are not in use.

Foam Systems

186. Tanks shall be equipped with a standard Class C automatic foam extinguisher system. (See Standards for Foam Extinguisher Systems.)

187. Goods over drain boards are not ordinarily subject to good protection from foam systems, but foam protection may be used in special cases where such protection will be adequate because of arrangement and other local conditions.

188. Where the foam is used on rectangular tanks, their corners should be rounded or provided with rounded plates and provision shall be made to prevent the surface of the protected liquid rising higher than two inches from the top of the tanks; or four inches in case of tanks over 25 square feet in area.

NOTE: The rounded corners are devised that the foam may entirely cut off the fire in the liquid at the corners; the extra height above the surface of the liquid is necessary to prevent the foam flowing out of the tank.

189. Where a tank is protected by an automatic foam extinguishing system and it has an overflow pipe 4 inches or larger in diameter, the overflow pipe shall be provided with a screen of not exceeding ¾-inch mesh.

NOTE. This is to prevent foam wasting out the overflow pipe.

Carbon Dioxide Systems

190. Tanks shall be equipped with a standard Class B automatic carbon dioxide gas extinguishing system. (See Standards for Carbon Dioxide Fire Extinguishing Systems.)

191. Drain boards and stock over drain boards, unless otherwise adequately protected, should be covered by the carbon dioxide system. Dipping machinery over or closely adjacent to tanks and drain boards should also be so protected in areas not protected by standard automatic sprinkler systems or other adequate protection.

Carbon Tetrachloride Spray Systems

192. Where approved by inspection departments having jurisdiction tanks may be equipped with an automatic carbon tetrachloride spray system of special sprinklers designed to discharge a limited amount of carbon tetrachloride in a fine spray sufficient to extinguish a fire in the tank without resulting in overflow of the contents.

Water Spray Systems

193. Tanks, drain boards and stock over drain boards unless otherwise adequately protected shall be protected with a standard automatic water spray extinguishing system. (See Standards for Water Spray Nozzles and Extinguishing Systems.)

Automatic Drains

194. DRAIN PIPES: Where required Class A tanks having a liquid surface 25 square feet or over shall be provided with drain pipes and valves arranged to operate automatically in case of fire, as follows:

500 to 750 gal. capacity—3 in.
750 to 1,000 gal. capacity—4 in.
1,000 to 2,500 gal. capacity—5 in.
2,500 to 4,000 gal. capacity—6 in.
Over 4,000 gal. capacity—8 in.

NOTE. When very heavy liquids are used larger drain pipes may be required.

195. Drain pipes shall be provided with traps or approved flame arresters to prevent fire flashing through the drain pipes when the tank is empty.

196. VALVES shall be approved type, preferably of the sliding disk and lever pattern. The mechanism should be arranged so that the valve will receive an initial blow to overcome any slight sticking upon the operation of the automatic device.

197. DRAIN TANKS: Drains should preferably terminate in outside buried tanks properly vented and otherwise

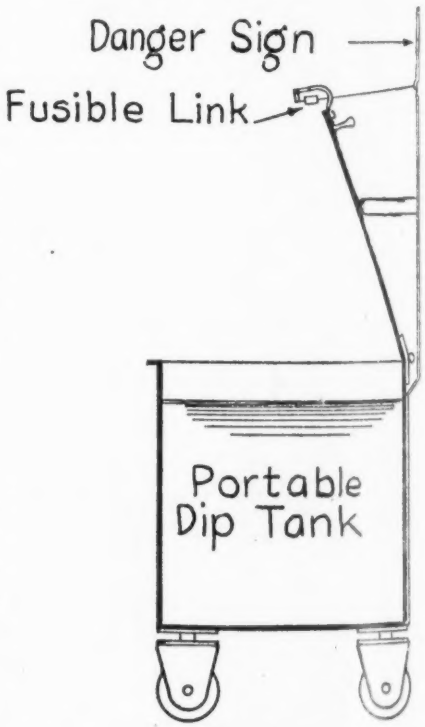

Fig. 7
A portable Class B tank with an automatic cover.

arranged in accordance with the standards for Flammable Liquids so far as they apply. Tanks may be located inside buildings directly below the dip tanks, however, subject to the approval of the inspection departments having jurisdiction, but in this case the vent pipes from the tanks should be securely supported and be carried directly outside the building.

NOTE. Means should be provided for returning the liquid from the drain tank to the dip tank, preferably by a pump.

Overflow Pipes

198. OVERFLOW PIPES shall be arranged to conduct overflowing liquids and heavy vapors to a safe place, preferably outside the buildings. Overflow pipes from tanks may be connected to the drain pipe system if properly trapped. Where tanks are filled by a pump the overflow pipes should bypass the pump.

FLOW COAT WORK

NOTE. The rules for Dip Tanks also apply where applicable. (See Articles 1-193.)

301. Paint shall be supplied preferably by direct pumping with low pressure and the pump should have a relief valve or a by-pass so as to prevent the accumulation of high pressure in the pipes when all outlets are closed. If a gravity feed supply tank is used it shall be securely supported on a non-combustible structure. Tanks shall be kept tightly covered and the main discharge therefrom provided with a valve, preferably controllable not only at the tank but also from a safe distance from the hazardous process. Capacity of each gravity tank shall not exceed 50 gallons. In pumping systems working in conjunction with a small gravity tank, there shall be provided a liberal sized overflow from the gravity tank back to the supply for the pump. For small equipments a portable gravity tank not exceeding 10 gallons capacity may be approved if rigidly supported or if suspended on a wire cable.

302. Piping shall be strongly erected and rigidly supported. Valves shall be provided in pipes where flexible hose is taken off and these shall be kept closed when hose is not in use.

303. The drip pan or drain board shall be non-combustible and supported on non-combustible structures. It shall be drained to separate closed tanks or if several pans are drained to a single tank each drain pipe shall be separately trapped. A separator or other means should be provided to prevent water from sprinklers or hose which may be discharged on the drip pan from flowing down the pipe and overflowing the drain tanks. Where returns from drip pans pass to open filter or settling tanks, all pipes shall be provided with traps to prevent fire spreading from the flow coat room to these tanks.

304. Inspection departments having jurisdiction shall be consulted as to whether provision should be made by the use of approved heat actuated devices to automatically drain gravity tanks and to shut down the pumps under pressure feed.

305. Floors should be watertight and arranged to drain so that burning flammable liquids flowing on water may be conducted to a safe place, door sills being raised where necessary, and scuppers, special drains, or other adequate provisions made for this purpose.

306. Flow coat occupancies, where not protected with a standard automatic sprinkler system, may be protected by an automatic foam extinguisher system or a carbon dioxide gas extinguishing system. (See Standards for Foam Extinguisher Systems and Standards for Carbon Dioxide Fire Extinguishing Systems.)

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Protecting Pre-Plated Metals

By KENNETH MAIN

Apollo Metal Works, Bethlehem, Pa.

ONE of the most efficient methods of saving critical materials, by stretching the available supplies of nickel, chromium, brass and copper, when the country undertook to arm itself for World War II, was discovered in pre-plated metal, manufactured by the Apollo Metal Works in Chicago and Bethlehem, Pa., and protected with a transparent strip-off lacquer.

Piece plating of stamped parts, in which a relatively thin coating of critical metal is electrolytically deposited on steel, has long been recognized as effecting enormous savings of nickel and chromium. The plating acts as a rustproof agent, as a reflector, or as an electrical conductor, frequently saving as much as 68 per cent of the critical metal used in alloys.

The disadvantage of plating separate parts, however, is that it entails slower production with higher cost, on account of the time wasted in transporting parts from the stamping shop to the plating shop, unpacking, sorting, inspecting, wrapping, repacking and carting back to the contractor. To meet the urgencies for saving material, and at the same time to accelerate the delivery of war goods, American war industry adapted to its new manufacturing exigencies methods which American peace-time industry had used successfully for many years.

As a peace-time product, Apollo pre-finished metal was utilized by industrial designers to modernize hundreds of products ranging from washing machines to popcorn roasters. Furthermore, its use in industry had been urged by engineers to reduce handling costs of piece plated parts and the high overhead charges associated with this method of finishing. In war production as in peace, pre-finished metals save time by eliminating the need for the individual finishing of stamped parts, cut costs by reducing the amount of expensive metals used, obviate the need for a high investment in plating equipment, and provide the means for volume production of plated stamped parts guaranteed to an unvarying standard of quality. Pre-plated metals bridge the gap between the time stamped parts are dropped from the press until they are delivered to the production line by the plater.

In accelerating the production of many parts used in war equipment, pre-finished metals have been made even more useful by the application of a strip-off lacquer. This inexpensive transparent coating holds tenaciously and continues to stretch with the highly finished surface when the metal is formed or stamped. It is credited by the Apollo Metal Works and by war contractors as the element responsible for the enormous production of stamped and formed parts of highly finished pre-plated metal with unskilled help.

Stripping protective coating from pre-plated formed piece.

These pre-plated sheets and coils are being successfully worked in power brakes, in hand brakes, and in high speed stamping presses without constant attention to the smooth working surfaces needed when unprotected, highly finished metal is fabricated. In handling polished metal, occasions for defacing it are present from the time the sheets are removed from the packages until the finished part reaches its destination. Unless the metal is armored against rough handling, it will be spoiled even before it reaches the forming operation. The stripping lacquer insures the metal reaching the fabricating stage without scratches or other defacements.

As the pre-plated parts are brought from high speed presses direct to the assembly line, the lacquer again preserves the finish against scratches, making it unnecessary to give special attention to the way the parts are handled as they are transported from one department to the next. Finally, in assembling the equipment, if the part made from Apollo pre-finished metal should be subjected to rough handling, the lacquer continues to guard the mirror finish.

When the work is finished, the lacquer may be stripped from either a flat surface or from a stamped part of intricate design by lifting one edge and peeling it off. Age does not increase the tenacity of the coating for the metal, nor does excessive drying permit the coating to separate from the surface it is intended to protect from rough usage. Oil will not deteriorate it. Thus, the lacquer covered parts may be stored indefinitely, even when covered by lubricant.

Apollo pre-finished metal is manufactured by electrolytically depositing an impervious plate of nickel, nickel-chrome, copper, or brass on selected steel in sheets or rolls. The plate is either highly polished or satin finished. As the metal comes from the final polishing, the stripping lacquer is sprayed on the polished surface at a minimum film thickness of one mil and is allowed to air-dry from six to eight minutes. Thenceforth, it protects the material as the sheets are boxed, guarding the mirror finish against foreign materials which may inadvertently find their way into boxes when they are sealed, or which may be picked up in transit.

Apollo pre-finished metal, covered with stripping lacquer, is found in hundreds of items used in war equipment. Some of the uncensored uses include signaling mirrors, barracks mirrors, individual mirrors for service men, reflectors for running lights on ships and for other lighting equipment, etched instruction and data plates, etched and embossed recording dials, and dozens of parts for electronic equipment.

As industry looks forward to peacetime reconversion with its attendant competitiveness, the advantages of designing with pre-plated metals will be even more widely recognized. Protected with lacquer, their conventional mirror finish as well as their modern striped designs and crimped patterns will recommend themselves for thousands of new products.

One of a series of articles on the preparation of metal surfaces for protective finishes.

INFORMATION VITAL TO WAR PRODUCTION

A MATERIAL AID TO INCREASING OUTPUT AND MINIMIZING REJECTIONS. ORDNANCE INSPECTORS AND MANUFACTURERS CONTRIBUTING TO WAR PRODUCTION BUT WHO ARE FABRICATING METALS FOR THE FIRST TIME WILL FIND THESE ARTICLES ESPECIALLY VALUABLE.

A Chemically Clean Surface!
What is Clean and Why Necessary?

A clean metal surface is a surface freed of all *invisible*, as well as visible contaminants. Only chemically clean metal surfaces will retain a satisfactory protective coating of paint or lacquer indefinitely.

The metal industry, after many years in research endeavoring to prevent premature failure of paint on metal surfaces, found the chief cause of failure to be improper cleaning in preparation for paint. Serious difficulties are being experienced today with protective finishes for war materials which must be protected to withstand all kinds of climatic conditions.

Proper Cleaning Essential

Proper cleaning is more than the removal of visible rust, scale and oxides, or even the microscopic particles remaining in the surface pits—the rust producers and other invisible contaminants must be removed or so changed that they will not develop under the applied finish.

It is unsafe to judge the condition of the cleaned surface by its uniformity and apparent "cleanness" which often have been the criteria by which contractors and inspectors have judged the merits of the cleaning cycle. Many materials will give a clean and uniform-looking surface to metal, which has been freed of visible impurities, yet will leave it highly unsafe to paint. Addition to the rinse water of *alkaline* materials will generally do just this. Among the alkaline materials that are added to rinse baths are caustic soda, soda ash, sodium chromate, mixtures of sodium chromate and sodium bicarbonate. If the metal has been cleansed by an alkali process and then rinsed in an untreated water bath, there is bound to be an alkali accumulation retained which will be harmful to organic coating life.

The suitability of a surface to take and hold a protective coating cannot be assumed from the appearance of the metal surface. The invisible impurities are often as harmful as the visible ones. These impurities, carried into the rinse from the cleaning bath, include alkalies and alkaline salts (always present in the water), salts of iron (such as the chlorides and sulphates which remain from pickling operations) and soluble material, such as soap, sulphated or sulphonated wetting or emulsifying agents, etc.

A Safe Type of Cleaner

Deoxidine is the original phosphoric acid type cleaner and is highly desirable and efficient. Deoxidine contains, in general, phosphoric acid, grease solvents, wetting agents, emulsifying agents, and sometimes inhibitors of acid attack on steel. It is formulated for use hot or cold, of various acid strengths and with various amounts of grease-removing agents so that it may be used for the removal of all but the heaviest grease.

Use of the correct type of Deoxidine (whether or not preceded by a preliminary cleaning in alkali or by pickling in sulfuric or hydrochloric acid) affords a method for removal of visible impurities which leaves the least amount of invisible harmful residues.

Traces of phosphoric acid left behind are not harmful to paint life. Further—work cleaned with Deoxidine is less sensitive to the final rinsing than work cleaned with, for example, alkalies or the usual pickling acids. (Alkali cleaners will not remove rust or scale.) The importance of the final rinsing operation cannot be minimized.

This will be discussed in a future article.

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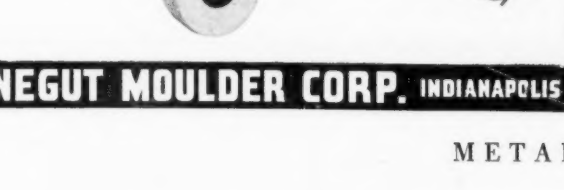
Marschke Swing Frames have proved extra fast and dependable in polishing large or awkwardly shaped surfaces such as kick plates, airplane propellers, locomotive side rods and link motions. Good maneuverability—with the weight and power to get the most out of any buffing wheel — make these smooth running Marschke Swing Frames far more productive in such service than flexible shaft driven or portable electric machines.

Write for Catalog of bench, pedestal and swing frame Marschke Buffers to Vonnegut Moulder Corp., 1857 Madison Ave., Indianapolis 2, Indiana.



Marschke Swing Frame with 16" x 6" wheel for heavy work.

MARSCHKE QUALITY GRINDERS AND BUFFERS

VONNEGUT MOULDER CORP. INDIANAPOLIS

Business News

The research department of *Commercial Solvents Corp.*, Terre Haute, Ind., has been joined by *Mr. D. T. Aldrich*, *Mr. J. W. Brodhacker* and *Mr. C. L. Gutzeit*.

Mr. Aldrich will be in the bacteriological division. He was formerly instructor at Purdue University of Pharmacy and recently received his degree of Master of Science.

Mr. Brodhacker will be associated with the engineering group. He was recently graduated from the Missouri School of Mines, receiving his degree in chemical engineering.

Mr. Gutzeit holds B.S. and M.S. degrees from Cornell University and obtained his Ph.D. degree at the University of Texas. He has been associated with Best Foods, Inc., and Standard Oil Development Co. He will work in the organic chemicals section of the research department.

The appointment of *Mr. Rex Wilson* to the post of Chicago district representative has been announced by the *Ferbert-Schorndorfer Co.*, Cleveland, Ohio.

Mr. Wilson has been associated with the Navy Supply Dept. in Chicago. He was formerly sales manager of Hooker Glass and Paint Mfg. Co. and district manager of the American-Marietta Co.

Pratt and Lambert, Inc., Buffalo, N. Y., has announced a number of promotions and appointments: *Mr. R. W. Kramer* as special industrial sales representative; *Mr. D. Merhof* as assistant to the manager of the industrial sales division; *Mr. N. J. Miller* as head of the lacquer and synthetic enamel laboratory; *Mr. E. J. Lewis* as head of the analytical and raw materials laboratory; and *Mr. C. J. Wilt* to the synthetic enamel laboratory.

Mr. Henry F. Forster has been elected director and treasurer of the *Keystone Varnish Co.*, Brooklyn, N. Y.

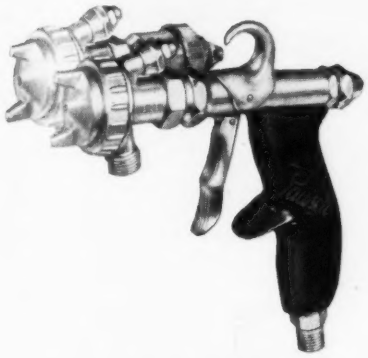
Mr. Forster has been assistant treasurer of the company since 1923. From 1919 to 1923 he was office manager. Mr. Forster is also treasurer and director of the *Jas. H. Prince Paint Co.*, Boston, Mass. and director of the Paint and Allied Industries Credit Assn.

Mr. E. S. Phillips, president of *Devoe and Raynolds Co., Inc.*, Louisville, Ky., has announced the election of *E. P. Kelly* to the board of directors and the appointment of *Renshaw Smith, Jr.*, as secretary.

Mr. Kelly is a vice-president of *Peaslee-Gaulbert Paint and Varnish Co.*, Louisville, Ky., an affiliate of Devoe and Raynolds Co.

Mr. Smith is general sales manager. He became associated with the company in 1922 and previous to his present position was New York branch manager, Chicago sales manager and general manager of the Boston affiliate, Wadsworth Howland Co.

New Equipment



Multi-Fluid Airbrush

Mixing two or more materials in the air as they are applied to the surface being coated is the unique feature of the Paasche Multi-Fluid Airbrush, Type F1020. One of the principal uses of this gun is the spraying of Latex and Ascetic Acid, mixing the two fluids in the air as they are being applied. For the application of Latex the airbrush is equipped with stainless steel lined fluid bodies, stainless steel tips and needles. The airbrush is also used for applying two or more colors together to produce unusual blended effects.

The illustration shows a Multi-Fluid Airbrush with two fluid bodies. The needle valve of the special fluid assembly connected to the main body of the airbrush is actuated by a piston in an air cylinder, thus simultaneous operation is effected by pulling the one easy-action trigger. The airbrush is also supplied for three-color or material application.

Each spray pattern is controlled individually from small round to wide fan by a calibrated adjustment. The position of one fluid assembly is adjustable so the spray patterns can be made to converge and the materials mixed in the air, or the materials may be applied separately to produce two-tone effects, when different colors are used.

Further information may be obtained by writing to Paasche Airbrush Co., Dept. OF, 1944 Diversey Parkway, Chicago 14, Illinois.

Color Filler

A color paste, Maximent, for filling in recessed letters and other figures, has been announced by Lincoln Products Co., Dept. OF, P. O. Box 161, Ft. Wayne, Ind. Suitable for use on metal and plastic dials, nameplates, terminal boards, etc., this material is wiped in with a swab or narrow spatula and the excess wiped off with a damp cloth. It is said to dry in ten minutes and to reach its final set in twenty-four hours after which it is quite heat resistant and not attacked by alcohol, acetone, gasoline or lacquer thinner. Water resistance is obtained by coating with clear lacquer.

Maximent is available in black, white and eight colors. It is packed in handy collapsible tubes.

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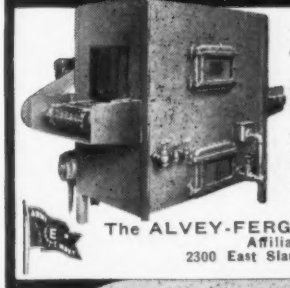
926 EXCHANGE ST. ROCHESTER, NEW YORK

METAL PRODUCTS *CLEANING* AND *FINISHING* EQUIPMENT



MOST progressive producers of metal products now regard product cleaning as a vital step in *speed production!*

You can lower your production costs still more by the use of A-F "standard" Cleaning and Finishing Equipment or A-F Equipment *especially designed* to solve your particular problems.

Because of our thorough knowledge of the application of both conveying and cleaning equipment, A-F Cleaning and Finishing Equipment is frequently designed as an integral part of an entire production line. In some cases, by the use of automatic temperature control, your products are cleaned *automatically* while en route between operations.

Write for folders showing standard and custom-built equipment—today.

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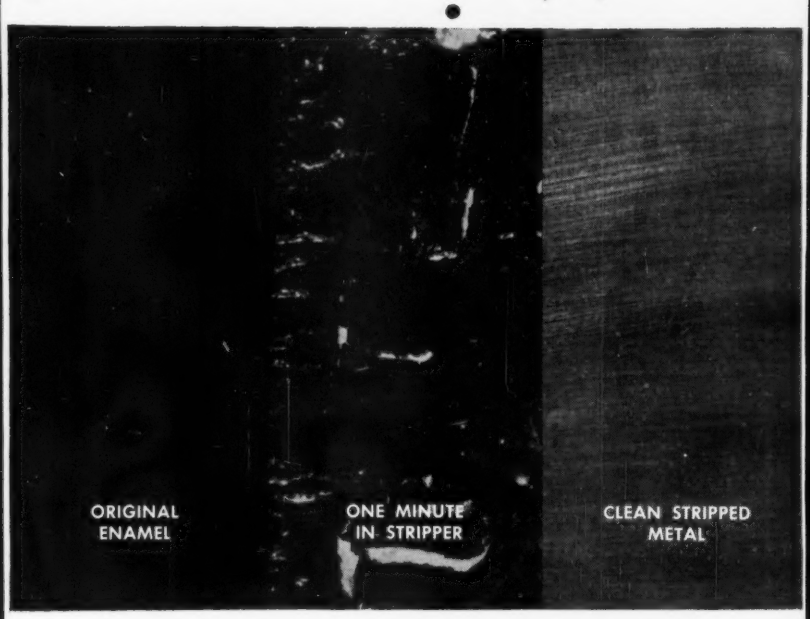
Affiliated Corporation: The Alvey-Ferguson Co. of California.
2300 East Slauson Ave., P.O. Box 396, Vernon Branch, Los Angeles 11, Cal.

CONVEYING EQUIPMENT

CONVEYING A-F MACHINERY Alvey-Ferguson

METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

Enamel Strippers*



NOTICE HOW ENTHONE ENAMEL STRIPPER WRINKLES AND COMPLETELY REMOVES ENAMEL FROM BASE METALS.

SURFACE IS CLEANED AND READY FOR PAINT.

THE ENTHONE CO.
NEW HAVEN, CONN.

*Patented by U. S. Patent No. 2242106

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Agateen —*The Last Word in Quality*

Agate Lacquer Mfg. Co., Inc.
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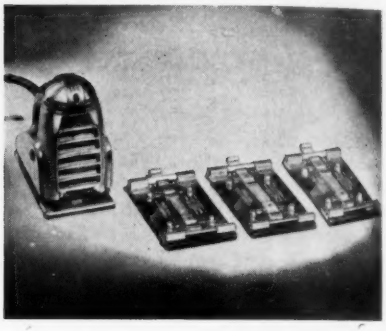
LONG ISLAND CITY, N. Y.

Detachable Sanding Pad

An outstanding feature of the new Sterling 1000 Electric Portable Sander is the flexible sanding pad which detaches from the machine by simply pulling out a latch. Several pads loaded with abrasives can be kept near work for quick exchange. When different grades of abrasives are used on a job, additional pads loaded with coarse and fine grits can be switched when necessary, thus avoiding the necessity for operator to stop work and reload.

The Sterling Sander is specially designed to cover the entire range of abrading from coarse sanding to lapping and finishing. It provides fast, precise, uniform cutting on wood, metal and plastic. The sanding pad is flexible and will conform to convex or concave surfaces of moderate curvature. Special pads



for unusual contour sanding or rubbing are also available. The tumbler action locks on the Sterling sanding pad can be easily operated by a key that is furnished with the machine or by a screwdriver. As tumblers are turned to lockup position, they draw in slack, pulling abrasive taut on pad. Tumblers operate with only about ¼ turn and lock abrasive securely in position.

Another feature of importance is the non-vibrating action of the Sterling 1000 while the sanding pad is moving at a speed of 4500 oscillations per minute. In fact, the vibration is so negligible that all the lettering on the nameplate (which is small) can be easily read when the sander is in operation. This smooth performance permits the operator to use it constantly without tiring and can be held without difficulty from any position with one hand.

Complete information may be obtained by writing to the Sterling Tool Products Co., Dept. OF, 358 East Ohio St., Chicago 11, Ill.

Synthetic Shellac

Arthur D. Little Laboratories, Cambridge, Mass., has announced the development of synthetic shellac. The new product is said to be essentially a duplicate of natural shellac, normally imported from India but not available in adequate amounts since the beginning of the war. It is claimed to be superior to natural shellac in some properties such as adhesion to metal and wood and resistance to water.

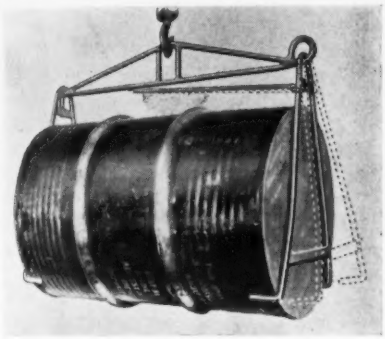
The synthetic shellac, made from available domestic materials, is being manufactured under the name Zinlac by William Zinsser and Co., Dept. OF, New York, N. Y., and is now being used in shipbuilding, life rafts, communications, gas masks, fuses and other military products.

Poroseel

Poroseel, an acid resisting and corrosion proof coating, is manufactured by the Pemco Corp., Dept. OF, 5601 Eastern Ave., Baltimore 24, Md. This coating, which can be used direct to metal (aluminum, malleable-iron, cast iron or steel) in one or two coats by spraying, is said to be neither porcelain enamel nor orthodox finishing material. It is applied at 5 to 10 grams per square inch, dried at 300° to 350°F. (using infra-red lamps, if possible) and fired at 750° to 800°F. for 12 to 15 minutes. It is claimed to be insoluble, impervious to thermal shock and highly resistant to heat and abrasion.

New Barrel Cradle

Especially designed for picking up barrels and plywood or fiber drums without chimes (flush ends), but may be used for picking up any other type barrel or drum. Built



of heavy bar stock, welded construction by Palmer-Shile Co., Dept. OF, 7124 West Jefferson Ave., Detroit 17, Michigan.

One end of barrel cradle is built rigid, while the other is pivoted and provided with strong spring which simplifies engaging of cradle fingers to any type drum or barrel.

Filling Compound

The Sterling Varnish Company, Dept. OF, 151 Ohio River Blvd., Haysville (Suburban Pittsburgh), Pa., announces R-943 Balancing Compound, a material designed for the balancing of electric motor armatures.

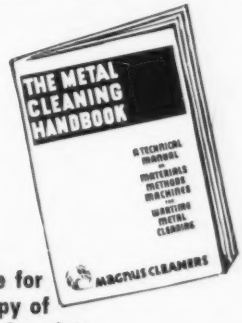
It is supplied in paste or soft putty form, so application can be made easily with the hands or with a knife. It will set in air at room temperature in about two hours to a condition such that it will not be affected by subsequent application of insulating varnishes. It does not, however, attain its maximum hardness and mechanical strength unless it is subjected to a temperature of 135° C.

Although Sterling R-943 Balancing Compound was originally intended for the balancing of rotating parts, it is said to be proving a highly interesting material for certain types of filling operations, such as coil margins and small interstices, where good adhesive qualities, a low coefficient of expansion, and high mechanical strength are required.

It is normally supplied in buff color but may be obtained in black if desired.

MAGNUS ALL-PURPOSE MACHINE FOR METAL CLEANING

Made in wide range of sizes to handle parts of every size and shape from bulk treated small units to individual pieces. Smaller sizes are portable.


THE METAL CLEANING HANDBOOK
A TECHNICAL MANUAL ON MATERIALS METHODS MACHINES AND WANTING METAL CLEANING
MAGNUS CLEANERS

Write for a Copy of This Complete Manual

HERE'S A NEW MACHINE ADAPTED TO ALL METHODS AND MATERIALS FOR METAL CLEANING

Whether your metal cleaning is best carried on through the use of alkaline solutions, emulsifiable solvents (Magnus Emulso-Clean), chlorinated solvents or any other type of cleaner, this machine will fit well in your production flow sheet. It can not only be used on any of these cleaning methods, but it can, in many cases be set up to use more than one method, where the process demands it.

This machine is unique in its method of providing agitation. Instead of the ordinary methods, the work itself is continuously moved up and down in a "dunking" motion which greatly increases both the speed and effectiveness of any cleaning material.

The Magnus All-Purpose Machine will speed up your cleaning operations. Let us work with you in selecting the right cleaning method and material to use. Magnus makes machines ***and*** cleaning materials, and can make unbiased recommendations.

MAGNUS CHEMICAL COMPANY

11 SOUTH AVENUE GARWOOD, N. J.

Representatives in Principal Cities

Magnus CLEANERS-METHODS-MACHINES

Anti-Fouling Paint

A resin chemical developed by Hercules Powder Co., Dept. OF, Wilmington, Del., is said to be helping lower the Navy's cost of keeping boats in drydock while the barnacles are scraped off their hulls. New anti-fouling paints currently being tested contain poison that prevents barnacles from cementing themselves to a ship's hull. According to the Company the resin, Hercolyn, acts as a plasticizer in these paints, keeping them open and soft, leaving the poisons free to protect the surface of the vessel.

These anti-barnacle paints are being developed to combat one of the oldest problems of the sea, for barnacles can cut a ship's speed by 25 per cent. A growth of barnacles can weigh as much as 30 tons on the hull of a 10,000-ton vessel.

Recording Viscosimeter

A new recording viscosimeter for paints, lacquers, varnishes, printing inks or any viscous material from approximately one poise upward is announced by the Brabender Corp., Dept. OF, Rochelle Park, N. J.

The viscosimeter combines the principles of the modified Stormer and McMichaels instruments. A cylindrical container is rotated at constant speed, the liquid within imparting torque to a paddle connected with a spring. A lever arm records consistency on a moving chart. Six speeds from 55 to 270 r.p.m., a variety of paddles and several torsion springs may be used.

Complete information and prices will be supplied on request to the Company.

Metal Treatment

A chemical treatment, Anozinc, for zinc coated and zinc-base diecastings has been announced by United Chromium, Inc., Dept. OF, 51 E. 42nd St., New York 17, N. Y. The coating, which is produced anodically in either black or yellow, is said to increase rust resistance, retard formation of white zinc corrosion products, and offer an excellent base for paints, lacquers and enamels.

The bath for producing the coating is operated at room temperature in an unlined steel tank. Steel cathodes are used and the work is made anodic at 6 volts or less. At a current density of 20 amperes per square foot about three minutes are required to produce the finish. Parts to be treated are generally racked and cleaned in a conventional cleaning cycle. Either steel or copper racks, equipped with spring contacts, may be used. Treated parts may be handled immediately after the final rinsing, no waiting period for the coating to set being required.

The company will furnish details on request.

Inside Drum Cleaner

An inside drum cleaner, claimed to be the most compact and efficient equipment for the purpose, is manufactured by The Vol-U-Meter Co., Dept. OF, 75 Wilbury Pl., Buffalo, N. Y.

Four-inch drive wheels turn the drum at 30 r.p.m. A channel iron carriage balanced on trunnions allows either end to be elevated. By alternately tipping the drum, both ends can be cleaned. The interior body surface can be cleaned by locking the carriage in the horizontal position. No locking device is required to hold the drum in place when the carriage is tipped. A ¼ h.p. motor drives the cleaner.

Cleaner

Quaker Chemical Products Corp., Dept. OF, Conshohocken, Pa., has announced their Quasol 936, a new water-soluble hydrocarbon cleaning material. The material can be applied to remove fats, soaps, mineral oils, to clean metal surfaces prior to painting, japanning, etc. It is employed in tanks or washing machines, preferably in the latter. There is said to be no danger of building up white formations on the surfaces since no alkali soaps are employed. A slight film remaining on the work after the cleaning operation is claimed to prevent rusting in transit or during short stocking periods.

One part of the material is mixed with 25 to 50 parts of water and the resulting solution is maintained at a temperature of about 160° F. Following the washing operation, a hot-water rinse is recommended.

Complete information may be obtained from the manufacturer at the above address.

Insulating Varnishes

The Sterling Varnish Company, 151 Ohio River Boulevard, Dept. OF, Haysville (Suburban Pittsburgh), Pennsylvania, announces the "Speedairbonds," a group of air-drying, insulating varnishes, designed for use in the manufacture and repair of electrical equipment.

The manufacturer claims the Speedairbonds to be the outstanding air-drying varnishes in the electrical insulation industry. They dry exceptionally fast to a smooth, glossy finish—they are oil-proof and extremely water, acid, and alkali resistant—they possess highest dielectric qualities—their flexibility and long life are unparalleled.

The Sterling Varnish Company maintains that Speedairbonds are ideal for complete protection and insulation under the most adverse circumstances and against the most severe atmospheric conditions.

Bulletin 243, entitled "Sterling Speedairbonds," contains descriptions of these varnishes and various Sterling specialty products, such as Stripping Compound, Balancing Compound, Rust Preventatives, Commutator Paints, Identifiers, etc. Your copy of the Speedairbond folder will be forwarded upon request.

Good lubricating properties . . . good "body" . . . ready solubility... these are the essential qualifications of a soap for metal burnishing. And Amber Flakes meets all of these qualifications generously.

You can depend upon this uniformly pure, neutral, high titer soap for top-notch, economical metal burnishing. Try Amber and you'll agree.

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Write today for Bulletin 4012 illustrating wide applications.
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Designers and Builders of Precision and Scientific Instruments

Patents

Antiskinning Agent

U. S. Pat. 2,339,984. M. A. Eitelman, assignor to Allied Chemical & Dye Corp., Jan. 25, 1944. An air-hardenable coating composition comprising (a) an air-hardenable mixture which loses its normal homogeneous character when exposed in bulk to air for a substantial period and (b) a proportion of an azone sufficient to inhibit the loss of the aforesaid homogeneous character.

Coating Composition

U. S. Pat. 2,340,280. H. L. Wampner, assignor to Commercial Solvents Corp., Jan. 25, 1944. A coating composition having reduced tendency to liver or agglomerate, which comprises a bronze powder, cellulose nitrate, and a neutral salt of malic acid.

Coating Composition

U. S. Pat. 2,340,338. J. D. Murray, Feb. 1, 1944. A normally solid thermoplastic coating composition comprising approximately 60 percent of a normally solid acetylation product of starch having a melting point between 245° F. and 325° F., approximately 15 percent chlorinated diphenyl resin as a diluent, and the remaining 25 percent consisting of a balanced proportion of active and latent solvent plasticizers containing at least 10 percent dimethoxy ethyl phthalate as an active solvent plasticizer and at least 10 percent diphenyl phthalate as a latent solvent plasticizer.

Rustproofing Oil

U. S. Pat. 2,340,996. W. H. Smyers, assignor to Standard Oil Development Co., Feb. 8, 1944. The method of preventing corrosion of metal surfaces in an atmosphere of high humidity, which comprises coating said surfaces with an organic composition consisting essentially of mineral oil hydrocarbons blended with a small proportion of an onium compound containing at least 10 carbon atoms per molecule in alkyl radicals and having substantial solubility and sufficient concentration in said hydrocarbons to prevent moisture and air from contacting with said metal surfaces.

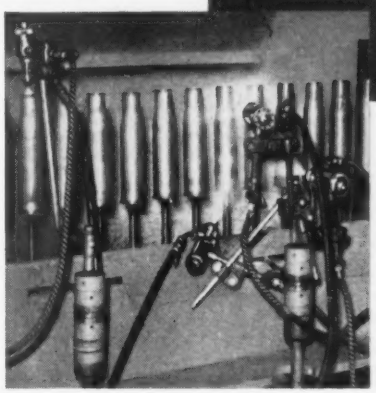
Paintbrush

U. S. Pat. 2,341,881. G. J. Rasch, Feb. 15, 1944. In a paint brush, a head, bristles secured to the head, tubes mounted in the head and extending into the bristles and including couplings arranged exteriorly of and close to one end of the head, rigid pipes detachably connected to said tubes by said couplings and including oppositely curved portions merging into each other to form a valve housing cooperating with the pipes in providing a handle for the head, said housing having a passage connected to both pipes at one end and having the other end thereof screw threaded, a fitting of a supply means threaded into the last-named end of the passage, and a compressible valve mechanism carried by the housing for controlling fluid through the passage from the supply means to the bristles.

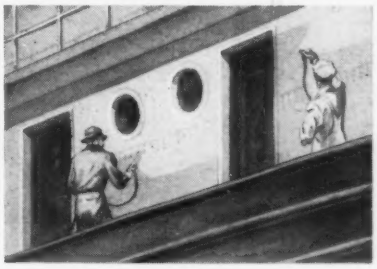
CUB
High-Production
AIRBRUSH

★ Light weight, perfect balance, enable operators to work longer hours at top speed.

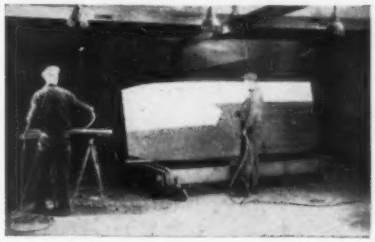
★ Superior performance speeds production rate; assures quality finishing.



Paasche Automatic Airpainting Units speed coating of shell cases. One of hundreds of applications.



Paasche Airbrushes speed painting of ships, boats, marine parts.



Here rapid coverage of Paasche Airbrushes speeds painting of pontoon-assault boat sections.

Finish the Job FASTER!

with PAASCHE AIRPAINTING Equipment

When you put Paasche Airpainting Equipment on the job, you save mighty minutes. Work that required tedious hours is done in a fraction of the time — and Victory speeded.

The illustrations at the left show only a few of the jobs on which Paasche Airpainting Equipment steps up production — saves man-hours — improves quality. Proof of this is evidenced in hundreds of factories — in shipyards — in aircraft plants — and on those big construction painting jobs.

Investigate Paasche time-saving Automatic Units — safer, cleaner Water Wash Booths — the High Production Airbrush illustrated — and other equipment for faster finishing.

Write for full information and literature. Paasche Airbrush Co. 1944 Diversey Parkway, Chicago 14, Illinois.

Paasche AIRPAINTING EQUIPMENT

MANY EFFECTIVE USES *for* TRIAD WATER-EMULSION CLEANERS

New developments in these water-emulsion cleaners have brought a much wider range of cleaning to many plants having varied production requirements.

GUARANTEED PERFORMANCE

All Triad Emulsion Cleaners are shipped on a guaranteed performance basis for thorough test on your production.

A few of the applications include:

★ Cleaning machined parts in washers for inspection and temporary rustproofing.

★ Removal of Magnaflux after inspection.

★ Removal of buffing, burring and lapping compounds.

★ Removal of pigmented drawing compounds.

Any type or combination of metals may be cleaned in Triad Emulsion cleaners. Solutions are used at temperatures up to boiling, and at working concentrations are free of fire hazard. Surfaces cleaned and dried are suitable for painting.

A test run in your plant may solve that cleaning problem which has given you trouble.

DETREX CORPORATION

13009 HILLVIEW AVENUE · DETROIT 27, MICHIGAN

Manufacturers' Literature

Finishing Equipment

An interesting 48-page loose-leaf book covering equipment manufactured by the company has been issued by *Newcomb-Detroit Co.*, Dept. OF, 5741 Russell St., Detroit 11, Mich. Paint spray booths, drying and baking ovens, rust proofing systems, industrial ventilating systems, and other equipment of interest to the finishing industry are completely described and profusely illustrated by both photographs and line drawings.

A section of the book is devoted to sheet metal engineering data. Much important information is given in the 36 pages constituting this section, including air handling data, properties of saturated steam, selection of heaters, weights of sheet metal and other materials, mathematical short cuts, etc.

Copies of this interesting and useful book may be obtained on request to the company.

Fire Extinguishers

Buffalo Fire Appliance Corp., Dept. OF, 44 Central Ave., Buffalo, N. Y., has published an 18-page booklet, available on request, covering fire extinguishers and supplies of their manufacture for all types of fires. Pump tank, soda-acid, non-freeze, foam, liquid and vaporizing liquid models are illustrated and described. Various classes of fires and their treatment are also discussed.

Chemicals

The new 144 page catalogue "Chemicals by Clyco" of the *Glyco Products Co., Inc.*, Dept. OF, Brooklyn, N. Y., has just been released. Considerable additions have been made including a number of plasticizers for synthetic rubber, synthetic resins, etc., as well as further information on the esters manufactured by the Company. The usual features have been retained and the manual is complete with formulae, suggestions and tables of useful chemical and physical data. All chemists, technical workers and executives in the Chemical industry are invited to write to the Glyco Products Co., Inc., Dept. OF, 26 Court St., Brooklyn 2, N. Y., for a free copy.

Protective Coatings

Twenty-four illustrated pages present the Carbozite company's line of industrial coatings, industrial corrosion preventives, product analysis, application charts and specific examples. This industrial catalog is available upon request to the Carbozite Corporation, Dept. OF, 1016 First National Bank Building, Pittsburgh (22), Pa.

Skin Trouble

The *Jones Medical Laboratories, Inc.*, Dept. OF, has published a four page circular, "Common Sense vs. Dermatitis." This circular may be obtained by writing to the company at 800 Huron Road, Cleveland 15, Ohio.

INDEX TO ADVERTISERS

A

Abbott Ball Co., Hartford, Conn. 231
Acme Mfg. Co., Detroit, Mich. 23
Agate Lacquer Mfg. Co., Long Island City, N. Y. 256
Aluminum Industries, Inc., Cincinnati, Ohio 254
Alsop Engineering Corp., Milldale, Conn. 32
Alvey-Ferguson, Cincinnati, Ohio 255
American Buff Co., Chicago, Ill. 34, 35
American Chemical Paint Co., Ambler, Pa. 253
American Nickeloid Co., Peru, Ill. 233

B

Bacon Felt Co., Winchester, Mass. 6
Baird Machine Co., The, Bridgeport, Conn. 8
Baker, M. E., Co., The, Cambridge, Mass. 45
Barber-Colman Co., Rockford, Ill. 233
Beam Knodel, Inc., New York 45
Beckman Instruments Div. National Technical Laboratories, South Pasadena, Cal. 221
Belke Mfg. Co., Chicago, Ill. 13
Bristol Brass Corp., The, Bristol, Conn. 43
Bullard Co., Bridgeport, Conn. 46

C

Chicago Wheel Mfg. Co., Chicago, Ill. 201
Chromium Process Co., Shelton, Conn. 43
Clinton Supply Co., Chicago, Ill. 45
Codman Co., F. L. & J. C., Rockland, Mass. 22
Columbia Electric Mfg. Co., Cleveland, Ohio 235
Crown Rheostat & Supply Co., Chicago, Ill. 229

D

Darco Corporation, New York, N. Y. 10
Detrex Corp., Detroit, Mich. ..... 260, Back Cover
Diversey Corp., Chicago, Ill. 219
Dulite Chemicals Corp., Middletown, Conn. 14
E. I. Du Pont de Nemours & Co., Wilmington, Del. 15

E

Eaton-Clark Co., Detroit, Mich. 234
Enthone Co., New Haven, Conn. 3, 232, 256

G

General Abrasives Co., Niagara Falls, N. Y. 225
General Ceramics Co., Keasbey, N. J. 18
General Solvents Co., Rochester, N. Y. 255
Globe Machine & Stamping Co., Cleveland, Ohio 40
Green Electric Co., W., New York, N. Y. 37
Greene, Tweed & Co., New York, N. Y. 36
Gumm Chemical Co., Inc., Frederick, Kearny, N. J. Inside Front Cover

H

Hamilton Emery & Corundum Co., Chester, Mass. 43
Hanson-Van Winkle-Munning Co., Matawan, N. J. ..41, 42
Harrison & Co., Haverhill, Mass. 229
Harshaw Chemical Co., The, Cleveland, Ohio 16
Hartford Steel Ball, Hartford, Conn. 43
Hay Co., Jacob, Chicago, Ill. 231
Heatbath Corp., Springfield, Mass. 20
Hogaboom, G. B., Jr., & Co., Newark, N. J. 220
Holland & Sons, Inc., Brooklyn, N. Y. 44

I

Industrial Filter & Pump Mfg. Co., Chicago, Ill. ..30, 238
Industrial Tape Corp., New Brunswick, N. J. 242
International Nickel Co., Inc., New York, N. Y. 223
Illinois Water Treatment Co., Rockford, Ill. 24

K

Kelite Products Inc., Los Angeles, Cal. 29
Keystone Emery Mills, Philadelphia, Pa. 233
Kirk & Blum Mfg. Co., Cincinnati, Ohio 28
Kocour Co., Chicago, Ill. 230
Krembs & Co., Chicago, Ill. 43
Kushner, Joseph, New York 220

L

Lacquer & Chemical Corp., Brooklyn, N. Y. 248
LaMotte Chemical Products, Baltimore, Md. 238
Land & Co., L. J., New York 44
Lasalco, Inc., St. Louis, Mo. 33
Lea Mfg. Co., The, Waterbury, Conn. 1
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill. 7
Lupomatic Tumbling Machine Co., New York, N. Y. 47

M

Maas & Waldstein Co., Newark, N. J. 244
MacDermid Incorporated, Waterbury, Conn. Inside Back Cover
Magnus Chem. Co., Garwood, N. J. 257
Magnuson Products Corp., Brooklyn, N. Y. 236
Mahon Co., R. C., Detroit—Chicago 262
Manderscheid Co., Chicago, Ill. 22
McAleer Mfg. Co., Detroit, Mich. 27
Michigan Chrome & Chemical Co., Detroit, Mich. 228
Mine Safety Appliances Co., Pittsburgh, Pa. 26
Motor Repair Co., Cleveland, Ohio 44
Munning & Munning, Inc., Newark, N. J. 43
Mutual Chemical Co. of America, New York, N. Y. ... 235

N

National Sherardizing & Mach. Co., Hartford, Conn. .. 233
Neilson Chem. Co., Detroit, Mich. 251
Nobs Chem. Co., Los Angeles, Cal. 232
Novitsky, Jos., Hollis, L. I., N. Y. 235

O

Oakite Products, Inc., New York, N. Y. 4
Osborn Mfg. Co., Cleveland, Ohio 12

P

Paasche Airbrush, Chicago, Ill. 259
Pennsylvania Salt Mfg. Co., Philadelphia, Pa. 21
Phelps-Dodge Refining Corp., New York, N. Y. 237
Phillips Mfg. Co., Chicago, Ill. 20
Platers Technical Service Co., New York, N. Y. 220
Plating Equipment & Supply Co., New York, N. Y. .. 45
Plating Process Corp., Holyoke, Mass. 28
Platt Bros. & Co., The, Waterbury, Conn. 233
Precimet Laboratories, New York, N. Y. 43
Promat Division, Poor Co., Waukegan, Ill. 25
Procter & Gamble, Cincinnati, Ohio 258
Puritan Mfg. Co., Waterbury, Conn. 230

R

Robinson, A., & Son, New York, N. Y. 220
Roe Mfg. Co., Lewis, Brooklyn, N. Y. 43
Rolock, Inc., Fairfield, Conn. 26

S

Sarco Co., Inc., New York, N. Y. 238
Sparkler Mfg. Co., Mundelein, Ill. 24
Speer Carbon Co., St. Marys, Pa. 40
Spraying Systems Co., Chicago, Ill. 238
Standard Plating Rack Co., Chicago, Ill. 41
Stevens, Inc., Frederic B., Detroit, Mich. 17
Sturgis Products Co., Sturgis, Mich. 9

T

Taber Instruments Corp., North Tonawanda, N. Y. ... 258
Tamms Silica Co., Chicago, Ill. 237
Tarbonis Co., The, Cleveland, Ohio 234

U

Udylite Corp., The, Detroit, Mich. 31
United Chromium, Inc., New York, N. Y. 5, 11, 227
U. S. Galvanizing & Pltg. Equipment Corp., Brooklyn, N. Y. 38

V

Vonnegut Moulder Corp., Indianapolis, Ind. 254
Vulcan Detinning Co., The, Sewaren, N. J. 43

W

Waterbury Rolling Mills, Inc., Waterbury, Conn. 233
Whittaker, Clark & Daniels, Inc., New York, N. Y. .. 30
Wrigley Co., Wm., Jr., Chicago, Ill. 226
Wyandotte Chemicals Corp., J. B. Ford Division, Wyandotte, Mich. 29

Z

Zapon Division, Atlas Powder Co., New York and Stamford, Conn., and North Chicago, Ill. 240
Zialite Corp., Worcester, Mass. 43

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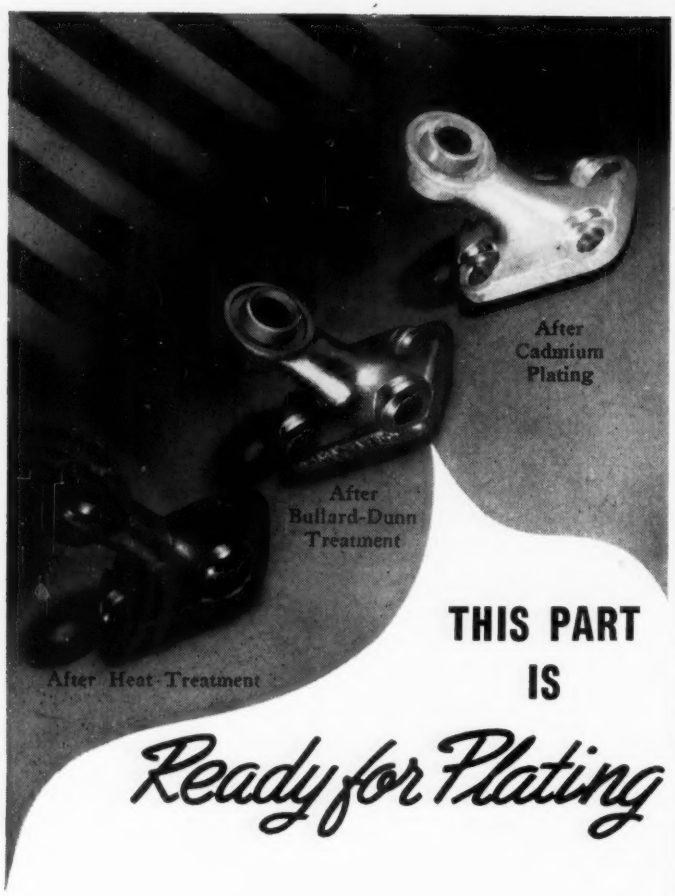

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ODDS and ENDS

Words Without Music Dept:

In a recent patent issued to an Englishman, the process of electroplating is called "electrolytically *provoking* a deposit." We understand that platers of automobile hardware learned long ago not to provoke a deposit lest it fly off the handle.

We are glad the flu season is over so that our scientific skepticism won't be provoked so often by mention of people *having* a temperature. When a person is found having NO temperature we will be interested. Why don't they call it a *fever* and keep us technical men happy??

Concerning the recent differences of opinion as to whether removal of burrs should be called *burring* or *deburring*, we find ourselves firmly ensconced, as usual, on the hot seat. By the drastic process of referring to the dictionary, *E. W. Berger* of Consolidated Vultee Aircraft Corp. has settled the argument and vindicated *Doc Kellner*. He lets us know that, according to Webster, *burr* means *to remove roughness from*, and deburr is incorrectly used in that form. In a frantic effort to squirm out of our embarrassing position we went back to Webster to look up *deburr* and found that *the word isn't even listed!* So instead of squirming out, we are just squirming.

High Cost of Living:

Fitchburg Plating Works, of Fitchburg, Mass., write in to let us know that on Monday, January 24th, they laid their copy of *Modern Electroplating* on the counter of the local grocery store and when they looked again it was missing.

Judging from what usually happens to the foreman's desk copy of the *Plating and Finishing Guidebook* whenever he turns his back, we come to the obvious conclusion that plating books have adhesive properties and, like gold anodes, have a tendency to stick to the fingers.

Bible Class:

We never knew that there were so many parodies on the 23rd Psalm such as the one we published here last month. The following, which arrived recently, is credited to *Robert Hayes* of The Edwal Labs:

Psalm of the Lab

With Apologies to David

The lab is my jeopard. I cannot breathe.
It maketh me to lie down with nausea.
It eateth my clothes with strong acid.
It destroyeth my soles.
It leadeth me in the paths of science for its own sake.
Yea, though I walk thru the welter of stinks and smells,
I will fear no chemical. For it is in me.
It provideth a bench for me in the presence of phosgene.
It loadeth my day with toil.
My beaker runneth over.
Surely bad tastes and odors shall follow me all the days of my life.
And I shall "smell" in the house of science forever.

What We Learn from the Ads:

A producer of activated carbon points out that the surface area of one pound of this material is equal to 3,000,000 9″ x 12″ sheets of flypaper (we could have said million, but the six zeros look more impressive). The comparison is made between flypaper and carbon because both imprison nuisances on their surfaces. Cleverly put, to say the least!!

Slogan of the Month:

No Blitz, No Huns, No Terrors—If You Buy War Bonds.